Report and Recommendation of the President to the Board of Directors

Project Number: 37139
March 2006

Proposed Multitranche Financing Facility
India: Uttaranchal Power Sector Investment Program

Asian Development Bank

CURRENCY EQUIVALENTS
(as of 6 March 2006)

Currency Unit	–	Indian rupee/s (Re/Rs)
Rs1.00	=	$0.0226
$1.00	=	Rs44.3387

ABBREVIATIONS

ADB	–	Asian Development Bank
CDM	–	Clean Development Mechanism
EIRR	–	economic internal rate of return
EMP	–	environmental management plan
FIRR	–	financial internal rate of return
FY	–	fiscal year
GDP	–	gross domestic product
GOU	–	government of Uttaranchal
HPP	–	hydropower plant
IEE	–	initial environmental examination
IPDF	–	indigenous peoples development framework
IPP	–	independent power producer
LAA	–	Land Acquisition Act
LIBOR	–	London interbank offered rate
NGO	–	nongovernment organization
O&M	–	operation and maintenance
PIU	–	project implementation unit
PMO	–	project management office
PTCUL	–	Power Transmission Corporation of Uttaranchal, Limited
RMU	–	renovation, modernization, and upgrade
SEB	–	State Electricity Board
SEIA	–	summary environmental impact assessment
SHPP	–	small hydropower plant
T&D	–	transmission and distribution
TA	–	technical assistance
UED	–	Uttaranchal Energy Department
UERC	–	Uttaranchal Electricity Regulatory Commission
UJVNL	–	Uttaranchal Jal Vidyut Nigam, Limited
UPCL	–	Uttaranchal Power Corporation, Limited
WACC	–	weighted average cost of capital

WEIGHTS AND MEASURES

GWh	–	gigawatt-hour (1,000 megawatt-hours)
ha (hectare)	–	unit of area
km (kilometer)	–	1,000 meters
kV	–	kilovolt (1,000 volts)
kW	–	kilowatt (1,000 watts)
kWh	–	kilowatt-hour
MVA	–	megavolt (1,000,000 volt-amperes)
MW	–	megawatt (1,000 kilowatts)
MWh	–	megawatt-hour
VA	–	volt-ampere

NOTES

(i) The fiscal year (FY) of the Government and its agencies ends on 31 March. The Government convention for designation of FY is followed in this document, i.e., FY2000 begins on 1 April 2000 and ends on 31 March 2001.

(ii) In this report, "$" refers to US dollars.

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FACILITY AND INVESTMENT PROGRAM SUMMARY

Borrower	India
Classification	Targeting classification: General intervention Sector: Energy Subsectors: Hydropower generation, transmission and distribution Themes: Sustainable economic growth, environmental sustainability Subthemes: Fostering physical infrastructure development; cleaner production, control of industrial pollution
Environment Assessment	Category A. A summary environmental impact assessment was prepared and circulated to the Board on 20 May 2005.
Sector Investment Program Description	Power and energy are essential for economic and social development in Uttaranchal. The government of Uttaranchal (GOU) has a long-term roadmap to strengthen the power sector. Besides capital investments to increase power generation and improve transmission and distribution, the roadmap also includes institutional change and capacity building for policy reform and improved financial management. Private sector participation in all parts of the power sector is an objective, as well as tariff regime improvements and the establishment of sound regulatory, legal, and governance frameworks. The roadmap is centered on clean energy development and energy efficiency, which are fast becoming priority themes in India, with particular relevance to states with the resources and physical conditions to broaden the generation base. A key feature of the roadmap is that it blends, phases, and sequences a diverse range of investment and noninvestment interventions over time. The overall objective is to raise output and efficiency while ensuring fully inclusive power services for all types of consumers: residential, industrial, commercial, and public administrations. The capital investment program (the program) itself will require about $12 billion over 2006–2018. This includes new assets and the rehabilitation of existing assets in generation, transmission, and distribution. Given the relatively large size of the program, and in view of the state's limited financial resources and institutional capabilities, the investments will be phased and distributed among public and private sponsors. Planned capital investments from 2006–2012 are estimated at about $5 billion. The financing plan involves central and state government authorities (through budget allocations), local banks, private sponsors, national utility companies, capital market operators, and international financial institutions including the Asian Development Bank (ADB). International loan syndications and bond issues are possible, the latter of which may be enhanced through guarantee products available from multilateral financing institutions and the

international insurance market. These enhancements can increase maturities and bring down the total cost of funds to the issuer.

The roadmap and the program (investment and noninvestment) are fully consistent with the government of India (GOI) “Power For All by 2012” policy objective, and fits well with ADB’s existing strategy for the sector.

Generation

At year-end 2005, Uttaranchal had generating capacity of 1,160 megawatts (MW), entirely from hydropower plants. Total theoretical potential is estimated at 20,000 MW. Capacity expansions planned through to 2018 total about 10,000 MW. There are 14 projects under construction, totaling 5,525 MW in new capacity by 2010. An additional 4,791 MW are in the development stage, with commissioning due soon after 2010, and an additional 9,090 MW is planned beyond that. Approximately $4 billion in new investment is required for new generating capacity to be commissioned by 2012, most of which will be provided by central public sector utilities (CSPUs), Uttaranchal Jal Vidyut Nigam, Limited (UJVNL), the state generating utility, and private sector developers.

The generation expansion program is dominated by clean energy development in the form of low-carbon generation operations, and energy efficiency improvements in the form of renovation and system loss reduction. While most of the new hydropower capacity during the first phase will come from large (more than 100 MW) and medium (25–100 MW) plants, the program includes small run of river hydropower plants (3–25 MW). Numerous candidate sites have been identified, with a cumulative capacity of around 1,000 MW, about 10% of which is now operating. Independent power producers are expected to develop about half of the small hydropower plants (SHPPs). SHPPs provide power directly to local grids (at 33 kilovolts [kV]), and therefore are integral to meeting rural electrification objectives. SHPPs can be constructed much faster than medium- and larger-sized ones, are environmentally friendly, and are expected to generate tradable carbon credits, with substantial financial upside to the project sponsors. ADB is providing assistance to GOU to develop carbon credit opportunities.

Transmission

The state-level transmission network needs to be expanded quickly to accommodate a four fold increase in generation and energy transfers by 2012. Transmission expansion is integrated with generation expansion activities, and calls for 785 kilometers (km) of 400 kV lines, 180 km of 220 kV lines, 665 km of 132 kV

lines, 8 substations, and auxiliary equipment. Power Transmission Corporation of Uttaranchal, Limited (PTCUL) is the lead project sponsor, and will require around $550 million to support these investments.

Distribution

The sector roadmap targets 100% village electrification by 2008 and 100% household electrification by 2012, which requires extending the 33 kV and 11 kV distribution networks. The state distribution company, Uttaranchal Power Corporation Limited (UPCL), is implementing a comprehensive system overhaul including energy audits, physical upgrades, expansion of service areas, and improvements in metering, billing, and collection. UPCL's business plan calls for about $370 million in new investment through 2012, which is being met through central Government incentive programs, state budget transfers, and revenue collection from ongoing operations. The company is moving toward fully commercial operations, and further restructuring covering operational, financial, and management matters is being considered by GOU, the Uttaranchal Energy Department (UED), and UPCL management. External financing may be required after the expiration of funds available under the Accelerated Power Development and Reform Program.

Policy Framework and Capacity

Uttaranchal's power sector was unbundled beginning in 2001, and operations have been rapidly evolving from a system run by regulated monopolies to one incorporating several private groups and more competitive market conditions. A number of reforms have been implemented, and others will be phased in between now and 2012. The Uttaranchal Electricity Regulatory Commission (UERC) actively monitors and promotes reforms to sustain commercial operations. Generation is the most open of the three subsectors, with central public sector utilities and private companies developing several major projects. The transmission sector has some current limitations to private sector involvement, but the policy framework caters for public and/or private initiatives, including joint ventures and wholly owned private sector operations, some of which may come on stream in the short to medium term. As noted above, the distribution subsector is undergoing a system-wide overhaul. Further restructuring will be implemented subject to careful planning and extensive stakeholder consultations. In the meantime, some design, construction, and maintenance operations will be outsourced to the private sector.

Capacity to implement the sector roadmap remains a constraint. At the central government level the capacity to formulate and execute policy reforms is sound, and to a large extent already

tested, since this is done mainly by the Ministry of Power and the Central Electricity Authority.

At the state level, GOU, UED, UERC, and the utilities have strong planning capability. Financial management and fiduciary oversight systems are in place, but can benefit from additional assistance and training. Policy formulation, project definition, project management, and project monitoring will be strengthened over the near term, and ADB intervention includes support for capacity building in these areas. The utilities have the capacity to plan and issue tenders for civil works contracts, the purchase of plant and equipment, and the issuance of concessions, joint ventures, and management contracts. ADB is providing ongoing technical assistance to improve capacity to comply with all relevant ADB policies and procedures, including governance, procurement, and safeguards. Additional support for these activities, including long-term human resource is included in the proposed ADB intervention.

Proposed ADB Intervention

The Government of India (GOI) and GOU have requested ADB to provide $300 million to partly fund a subset of the investment program covering generation, transmission, and capacity building. This represents a relatively small share of the total funding needs and financing plan. Having ADB as a partner (i) brings down the total cost of funds, (ii) sets out standards in various thematic areas, and (iii) helps to entice other long-term financiers to the sector. GOI and GOU have requested ADB to extend this finance in the form of a multitranche financing facility (MFF).

Multitranche Financing Facility

Up to $300 million to help fund the investment program during its first phase. The Multitranche Financing Facility (MFF) will be converted into individual loans in line with individual project readiness, as well as policy, safeguards, financial management, fiduciary oversight, and capacity building action plans. These loans will be made from ADB's ordinary capital resources. The utilization period of the facility will be 7 years.

Rationale

Uttaranchal is one of India's poorest states. Clean energy and tourism are two important economic growth and poverty reduction drivers. The state has undeveloped hydropower potential estimated at 20,000 MW. Harnessing this hydropower capacity is vital to meet all in-state demand and export power to surrounding states, and support investment in rural and other productive sectors.

Uttaranchal's power sector road map is based on (i) a memorandum of understanding with the Government of India for unbundling the former State Electricity Board; (ii) the subsequent unbundling into three state-owned utilities; (iii) the implementation of the Accelerated Power Development and Reform Program, which supports local grid strengthening and reduction of system losses; (iv) a tripartite agreement between the state, the central Government, and the Reserve Bank of India for settling accounts between the former State Electricity Board and its unbundled successors; (v) the state's new industrial policy for economic growth through the development of clean (no- and low-pollution) enterprises, which includes provisions for private sector participation in the power sector; (vi) the creation of an independent electricity regulator; (vii) the Accelerated Generation and Supply Program, which provides incentives for the renovation, modernization, and upgrade (RMU) of existing power plants; and (viii) a series of tariff orders for generation, transmission, and distribution that support the commercialization of the state-owned utilities.

Impact and Outcome

The program will support poverty reduction in Uttaranchal. It supports investments and enabling conditions conducive to economic growth and prosperity. Power remains a bottleneck to economic growth, affecting resident and industrial consumers alike. The program will generate exports to neighboring states and improve efficiency and cut energy leaks, operating and financial losses in the system.

The program will encourage reform, promote clean energy and energy efficiency improvements, and build capacity to effectively manage the ongoing multi-billion dollar expansion program. Capacity building activities will initially concentrate on implementation of investments funded by ADB, and will be expanded to support the broader sector reform agenda under GOU leadership.

The ADB-supported investments will increase power supplies by a significant amount by 2012, from large and small plants, by adding new assets, and rehabilitating existing ones. Transmission expansion will enable a more efficient transfer of power within the state, and the sale of excess power to the Northern Region grid. By 2012, the exportable surplus will be sufficient to supply 12 million residential customers. Expanded and improved quality in the service will cut costs, reduce the "cost plus" pressure on the tariff structure and benefit consumers. The SHPPs investments are expected to generate carbon credits, with significant financial upside to sponsors and consumers. ADB is providing ongoing assistance to expand expertise in Uttaranchal for carbon credit identification and trading.

Cost Estimates and Financing Plan

Investment Program 2006–2012	$ Million
Generation	
UJVNL Large Hydropower	700
UJVNL Small Hydropower	335
Central Public Sector Utility and/or Independent Power Companies	3,200
Transmission	550
Distribution	370
Total	**5,155**
Financing Plan	
Domestic	
UJVNL	440
PTCUL	100
UPCL	40
GOU	580
Central Power Sector Utilities	1,600
Private Sector	750
Power Finance Corporation	300
Local Banks, Private Equity, and Capital Markets	245
International	
ADB	300
Bilaterals	300
International Financial Institutions	500
Total	**5,155**

Facility Amount and Terms

The facility will provide up to $300 million, secured from the Ordinary Capital Resources of ADB, with final terms and conditions to be established under individual loan agreements based on prevailing ADB policies. Financing will be made available under ADB's London inter-bank offered rate (LIBOR)-based lending facility. The client has the option to choose between eligible currencies and interest rate regimes, which can change with each individual loan. Currency and interest rate swaps will be made available during the financing period. Repayment schedules can be structured in line with specific needs of individual loans.

Retroactive Financing

Retroactive financing may be available under individual loans for expenditures incurred 12 months prior to the signing of the corresponding loan agreement, with a ceiling of up to 20% of the loan amount (in line with the Board paper on *Cost Sharing and Eligibility of Expenditures for Asian Development Bank Financing: A New Approach*). The central and state governments have been informed that approval of advanced procurement action and retroactive financing does not commit ADB to finance any of the proposed subprojects.

Period of Utilization

Until 31 January 2013

Executing Agency and Implementation Arrangements

The Uttaranchal Energy Department is the program's overall executing agency. UJVNL, the state generating company, will be in charge of investments in generation. PTCUL will be responsible for transmission sector investments The Uttaranchal Energy Department will be the lead agency for capacity building activities.

Procurement

Equipment and materials to be financed under each loan will be procured in accordance with ADB's *Guidelines for Procurement* – following international and/or local competitive bidding. Procurement packages will be designed to maximize international competitive bidding opportunities. Advanced procurement action will be allowed to facilitate timely implementation of the investments.

Consulting Services

All consultants financed under each ADB loan will be selected and engaged in accordance with ADB's *Guidelines on the Use of Consultants* and other arrangements for the recruitment of domestic consultants acceptable to ADB.

Consulting services will initially focus on implementation and project management activities including subproject design, safeguards evaluations, procurement, financial management, reporting, and staff training. Additional tasks which may be covered are assistance with planning and policy formulation; carbon credit identification, certification and marketing; corporate development, including human resource development, information technology upgrades, and creation of a state-level power trading company.

Investment Program Benefits and Beneficiaries

The program covers investment and noninvestment interventions benefiting all consumers in rural and urban areas, including residential, industrial, public administrations, and commercial establishments. It will deliver on both quantitative and qualitative targets envisaged under the Power For All by 2012 policy objective. Besides generating more power supplies for users in the state itself (now in deficit), the program will also provide substantial surplus power for exports, which is expected to be a major source of revenue for the state.

The program is founded on clean energy development, a field where Uttaranchal has a clear comparative advantage vis-à-vis other states. Expanding clean energy capacity will generate local, regional, and global environmental benefits. Local air quality, particularly indoor air quality, will improve with the substitution of electricity for biomass (animal dung and wood) and kerosene. Regional air quality will be preserved by offsetting the expansion of thermal generating capacity. Carbon credit trading is expected to create significant dividends, with projected upside up to 15% of total capital outlays. Energy efficiency will be improved with substantial reductions in transmission and distribution system losses. Transmission investments are necessary to make other

investments in generation and distribution possible. The investment program will obviously create employment, tax revenues, and royalties to the state.

Risks and Assumptions

The program is accompanied by some risks, in particular cost overruns, commissioning delays, and lack of reforms necessary for sector sustainability.

Given the “cost plus” commercial or tariff regime prevalent in the industry in India today, cost overruns can be partially passed on to consumers, with negative financial and economic effects, especially on residential customers. This risk is small. The cost projections are based on conservative assumptions, and many of these investments fall within the jurisdiction of the central power utilities—experienced groups in terms of project preparation and execution. Implementation is being conducted more and more frequently on the basis of tendered engineering, procurement and construction turnkey contracts (EPCs), which are subject to considerable penalties on budget and time overruns, and come with project completion and commissioning guarantees.

Commissioning delays would put at risk not only in-state supplies but also exports to neighboring areas. Such risk is contained and managed through the “concession” contracts awarded to the short-listed sponsors. About 14 projects are already under way and most of the remaining ones are at an advanced stage of development and/or planning.

Capacity building and public policy reform are essential to the long-term growth and sustainability of the sector. The risk of a turnaround (or a material slowdown) in the reform process is possible but unlikely. GOI and GOU are publicly committed to the reform process, because reliable high quality power service is a key driver for growth and poverty reduction. The sector is also crucial for other investments to materialize, which in turn creates employment, better public goods and services and incomes. High-quality and reliable power supply benefits people and industry in rural and urban areas, and many critical public services, ranging from water and wastewater to education to health services. The reform process is well underway, and needs to be further nurtured.

Warranties and Representations

Uttaranchal has a well-defined power sector roadmap, a clear investment and noninvestment program, and the people and institutions to deliver on objectives and targets. The provision of ADB finance through a multitranche facility requires an agreement on key warranties and representations which are intended to ensure program success. A framework financing agreement (FFA) has been negotiated, which captures critical provisions for ADB financing including:

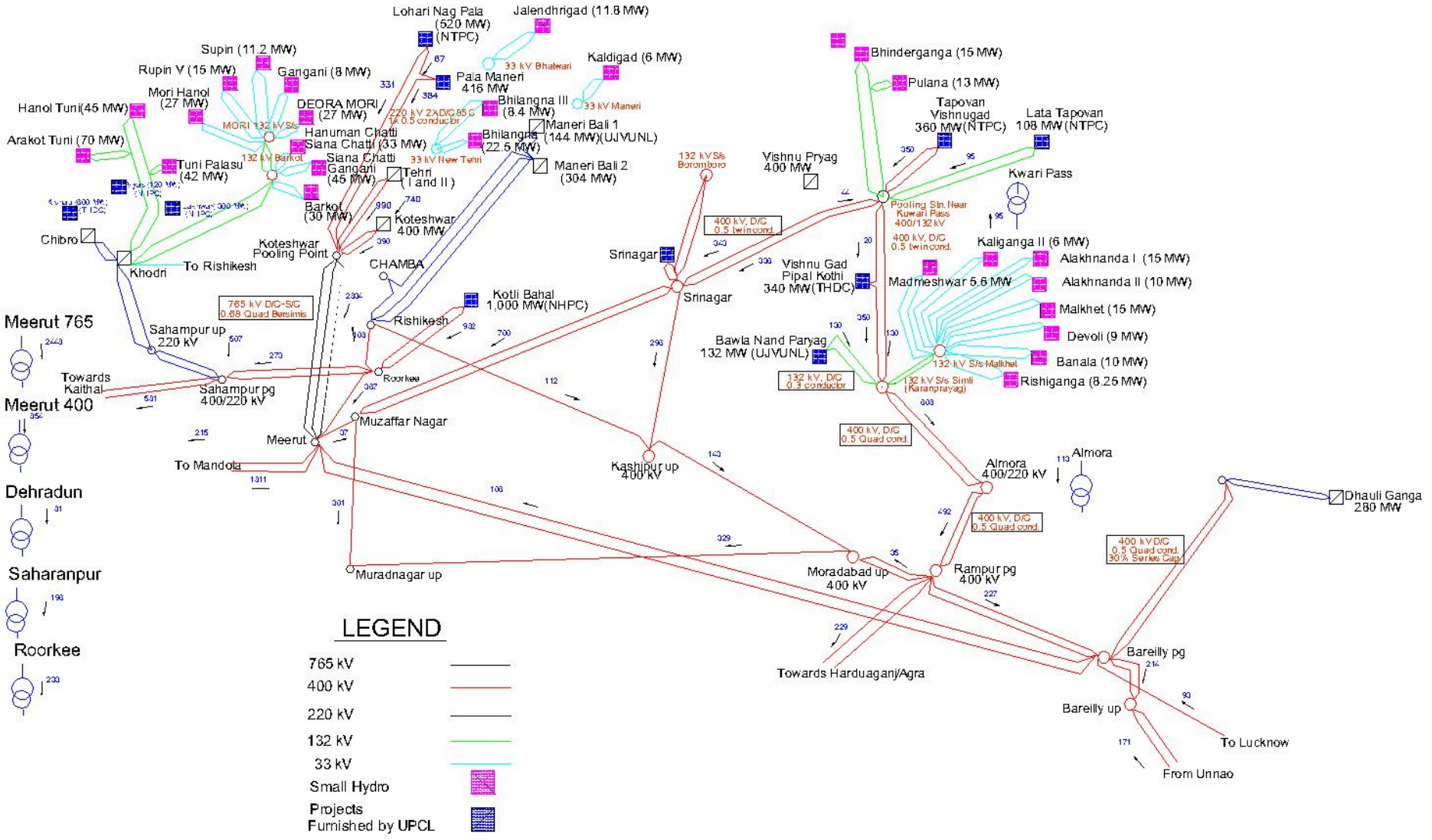
(i) subproject eligibility criteria, selection, and implementation,
(ii) capacity building,
(iii) safeguards framework,
(iv) procurement and disbursement procedures,
(v) financial management and fiduciary oversight,
(vi) monitoring, administration, and reporting.

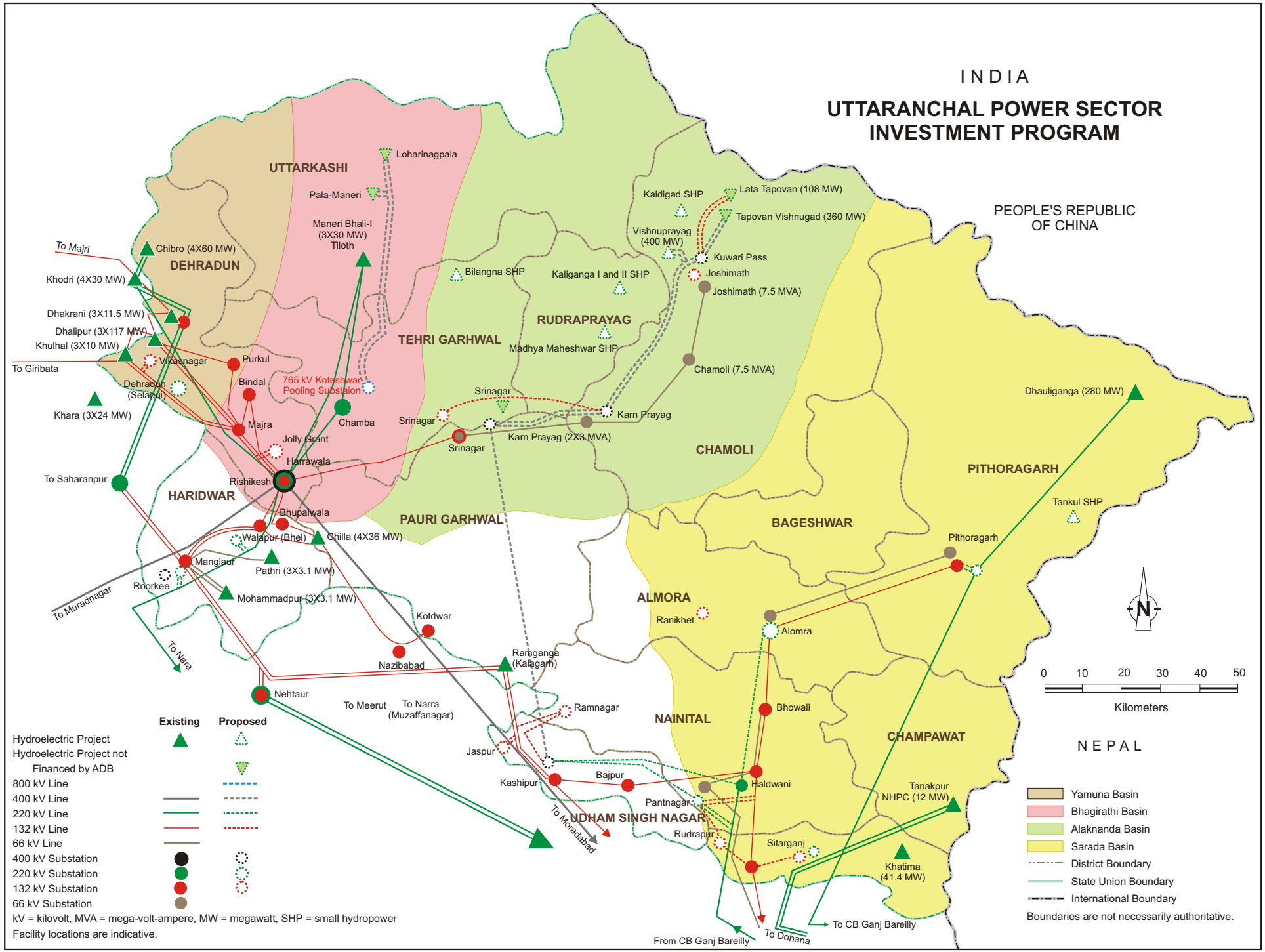
ADB will provide direct support to GOU and the executing and implementing agencies responsible for program implementation, from headquarters and through the India Resident Mission. A program support office has been established, which will coordinate specific implementation tasks, including procurement, subproject management, monitoring, and supervision. It will comprise professional, experienced staff especially in the areas of safeguards, financial management, administration and reporting. An MFF can be a flexible instrument for the authorities, but its viability requires a strong local presence and quality resources allocated to implementation.

ADB management and staff will report regularly to ADB's Board of Directors on the implementation of the program and the MFF. Board Information Reports will be submitted on an annual basis or more frequently if necessary. Each new financing request to be converted into a new loan will require evaluation on the performance of the previous one. ADB will conduct periodic review missions, which will include due diligence on warranties and representations made to ADB. In addition, staff will report on any issues or problems faced by the authorities and the execution agencies under the program, and the remedial actions suggested to overcome them.

Integrated Transmission Network for Evacuation of Power from Proposed Major and Small Hydro Project of Uttaranchal

YAMUNA BASIN PROJECTS | BHAGARATHI BASIN PROJECTS | ALAKNANDA BASIN PROJECTS | SARADA BASIN PROJECTS




INDIA
UTTARANCHAL POWER SECTOR INVESTMENT PROGRAM
PEOPLE'S REPUBLIC OF CHINA
NEPAL
UTTARKASHI
TEHRI GARHWAL
DEHRADUN
RUDRAPRAYAG
CHAMOLI
PAURI GARHWAL
HARIDWAR
BAGESHWAR
PITHORAGARH
ALMORA
NAINITAL
CHAMPAWAT
UDHAM SINGH NAGAR
Loharinagpala
Pala-Maneri
Maneri Bhali-I (3X30 MW) Tiloth
Chibro (4X60 MW)
Khodri (4X30 MW)
Dhakrani (3X11.5 MW)
Dhalipur (3X117 MW)
Khulhal (3X10 MW)
Vikasnagar
Purkul
Dehradun (Selaqui)
Bindal
765 kV Koteshwar Pooling Substation
Chamba
Majra
Jolly Grant
Harrawala
Rishikesh
Khara (3X24 MW)
To Majri
To Giribata
To Saharanpur
Bhupalwala
Walapur (Bhel)
Chilla (4X36 MW)
Manglaur
Roorkee
Pathri (3X3.1 MW)
Mohammadpur (3X3.1 MW)
To Muradnagar
To Nara
Kotdwar
Nazibabad
Ramganga (Kalagarh)
Nehtaur
To Meerut
To Narra (Muzaffanagar)
Ramnagar
Jaspur
Kashipur
Bajpur
To Moradabad
Kaldigad SHP
Lata Tapovan (108 MW)
Tapovan Vishnugad (360 MW)
Vishnuprayag (400 MW)
Kuwari Pass
Joshimath
Joshimath (7.5 MVA)
Bilangna SHP
Kaliganga I and II SHP
Madhya Maheshwar SHP
Chamoli (7.5 MVA)
Srinagar
Srinagar
Srinagar
Karn Prayag
Karn Prayag (2X3 MVA)
Dhauliganga (280 MW)
Tankul SHP
Pithoragarh
Ranikhet
Alomra
Bhowali
Haldwani
Pantnagar
Rudrapur
Sitarganj
Tanakpur NHPC (12 MW)
Khatima (41.4 MW)
From CB Ganj Bareilly
To Dohana
To CB Ganj Bareilly
N
0 10 20 30 40 50
Kilometers
Existing
Proposed
Hydroelectric Project
Hydroelectric Project not Financed by ADB
800 kV Line
400 kV Line
220 kV Line
132 kV Line
66 kV Line
400 kV Substation
220 kV Substation
132 kV Substation
66 kV Substation
kV = kilovolt, MVA = mega-volt-ampere, MW = megawatt, SHP = small hydropower
Facility locations are indicative.
Yamuna Basin
Bhagirathi Basin
Alaknanda Basin
Sarada Basin
District Boundary
State Union Boundary
International Boundary
Boundaries are not necessarily authoritative.

05-0455d RM

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed multitranche financing facility (MFF) to India for the Uttaranchal Power Sector Investment Program (Investment Program).[1]

II. RATIONALE: SECTOR PERFORMANCE, PROBLEMS, AND OPPORTUNITIES

A. Performance Indicators and Analysis

2. The Government of India has confirmed its intent to provide universal power service at an affordable price by 2012, which will require an estimated 100,000 megawatts (MW) of new capacity. The Government also intends to shift the ratio of thermal to hydropower generation from the current 75:25 to 60:40. Hydropower[2] is targeted for 30% of new generating capacity during the next two 5-year plans, of which 10,000 MW is proposed for development in the state of Uttaranchal between 2005 and 2018. Power sector analysis is presented in Appendix 2.

3. The 2003 Electricity Act is intended to improve governance in the power sector through continued institutional restructuring and improved management of sector entities to ensure long-term sustainability. Compulsory metering, open access to transmission systems, facilitation of power trading, lifeline tariffs for the poor and rural consumers, and rationalization of tariffs have been initiated. Generation, transmission, and distribution have been separated. The Central Electricity Regulatory Commission has prescribed detailed rules for cost accounting and allowable tariffs. Wholesale electricity sales are priced at the cost of transmission and production, including an allowed rate of return on equity investment of 14%. The costs of hydropower generation are estimated to be as low as $0.013 per kilowatt-hour (kWh) averaged over a plant's lifetime, with initial costs ranging from $0.04 to $0.05 per kWh. In Uttaranchal, consumer tariffs range from $0.03 per kWh to $0.078 per kWh, and in 2003, the average retail tariff across all consumer categories was $0.047 per kWh.

4. Uttaranchal was created on 9 November 2000 by splitting the state of Uttar Pradesh.[3] Per capita electricity utilization in the state is below the national average (about 284 kWh per capita per year compared with the national average of 606 kWh per capita per year), and economic development has been constrained by the lack of an available and affordable power supply. In 2003, statewide demand exceeded in-state supply by 10.2%. In 2004, this gap between demand and supply decreased to less than 5%. Electricity utilization has increased by 10 to 16% per year since 2000 and is expected to continue increasing at comparable rates through 2012. The state has little or no fossil fuel resources, and has therefore focused on developing hydropower and the associated transmission system for meeting local demand within the state and for exports of surplus power.

5. The former State Electricity Board (SEB) has been transformed into three state-owned utility companies: Uttaranchal Power Corporation, Limited (UPCL) is responsible for distribution

[1] The design and monitoring framework is in Appendix 1.

[2] India is heavily dependent on fossil fuel imports (coal, crude oil, and natural gas). Hydropower has a distinct comparative advantage for the provision of electric power.

[3] Uttaranchal was created as a separate state to accelerate economic development, which depends on two key resources: tourism and hydropower.

at 33 kilovolts (kV) and lower, rural electrification, and power trading;[4] the Power Transmission Corporation of Uttaranchal, Limited (PTCUL) is responsible for high-voltage transmission lines and substations from 132 kV to 400 kV;[5] and Uttaranchal Jal Vidyut Nigam Limited (UJVNL) takes a lead role in developing hydropower projects greater than 1 MW and manages private sector participation.[6] Private sector participation is open for more than 40 hydropower plants (HPPs) of less than 25 MW capacity and 13 projects ranging from 25 MW to 100 MW. The Uttaranchal Electric Regulatory Commission (UERC) was established as the independent state regulator in 2002.

B. Analysis of Key Problems and Opportunities

6. Energy services, especially reliable electric power, are essential for economic and social development in Uttaranchal. The government of Uttaranchal (GOU) has developed a comprehensive roadmap to strengthen the sector over the long run. Besides capital investments to increase power generation and improve transmission and distribution, the roadmap includes institutional change and capacity building for policy reform and improved financial performance. Private sector participation in all parts of the power sector is an objective, as well as tariff regime improvements and the establishment of sound regulatory, legal, and governance frameworks. The roadmap emphasizes clean energy development in the form of low-carbon power generation, and energy efficiency via renovation, modernization, and upgrade (RMU) of existing power plants, which are critical pieces of a sustainable energy strategy. A key feature of the roadmap is that it blends, phases, and sequences a diverse range of investment and noninvestment interventions over time. The overall objective is to raise output and efficiency while ensuring fully inclusive power services for all types of consumers: residential, industrial, commercial, and public administration. Planned capital investments from 2006–2012 are estimated at about $5 billion. The Government has requested external financial and technical assistance (TA) for implementing critical parts of this investment program.

1. Generation

7. The Northern Region grid has a power deficit that will persist for several years, but that can be cost-effectively ameliorated by developing hydropower in the mountainous states of Jammu and Kashmir, Himachal Pradesh, and Uttaranchal (Appendix 2). Uttaranchal has the greatest undeveloped hydropower capacity in the Northern Region grid, with 20,000 MW estimated to be commercially viable, but only 1,160 MW operating at year-end 2005. The GOU road map comprises an Investment Program centered on hydropower generation,[7] upgrade of existing transmission system, new high-voltage transmission lines and substations, distribution system upgrades and expansion, including rural electrification, and capacity building for improved sector efficiency.[8]

8. The state is currently a net importer of electric power, but generates a seasonal surplus and plans to become a net exporter of power by 2010 by expanding hydropower and high-voltage

[4] Power generation units are also allowed to engage in power trading according to provisions in the 2003 Electricity Act. Uttaranchal policy currently allows power trading to be managed by UPCL, with the intention of creating a power trading company in the near future.

[5] The Power Grid Corporation India, Limited will operate 765 kV lines.

[6] The Uttaranchal Renewable Energy Development Agency takes a lead role for projects of less than 1 MW. It also manages renewable energy projects, including off-grid development, with some support from bilateral donors and non-government organizations.

[7] The HPPs associated with the proposed transmission lines to be funded by ADB are all run-of-river designs.

[8] UPCL and the Uttaranchal Renewable Energy Development Agency are responsible for grid-connected and off-grid rural electrification, respectively.

transmission capacity. Currently 14 projects totaling 5,525 MW are under construction[9] and will be commissioned between now and 2010. An additional 4,791 MW are under development, with expected commissioning dates after 2010, and another 9,090 MW are planned (see Maps 1 and 2, and Appendix 2). The key developers are UJVNL, the state generating utility; central public sector utilities, including the National Thermal Power Corporation, the National Hydropower Development Corporation, and the Tehri Hydropower Development Corporation; and independent power producers (IPPs).[10] The existing HPPs were constructed in the 1970s and 1980s in association with irrigation systems and require major overhauls. A program for renovation, modernization, and upgrade (RMU) of existing HPPs has been defined with an estimated cost of about $150.0 million.

9. The generation expansion program is dominated by clean energy development in the form of low-carbon generation operations, and energy efficiency improvements in the form of renovation and system loss reduction. While most of the new hydropower capacity during the first phase will come from large (more than 100 MW) and medium (25–100 MW) plants, the program includes small run of river hydropower plants (3–25 MW). Numerous candidate sites have been identified, with a cumulative capacity of around 1,000 MW, about 10% of which is now operating. Independent power producers are expected to develop about half of the small hydropower plants (SHPPs). SHPPs provide power directly to local grids (at 33 kilovolts [kV]), and therefore are integral to meeting rural electrification objectives. SHPPs can be constructed much faster than medium- and larger-sized ones, are environmentally friendly, and are expected to generate tradable carbon credits, with substantial financial upside to the project sponsors. ADB is providing assistance to GOU to develop carbon credit opportunities.

2. Transmission

10. The state-level transmission network needs to be expanded quickly to accommodate a four fold increase in generation and energy transfers by 2012. Transmission expansion is integrated with generation expansion activities, and calls for 785 kilometers (km) of 400 kV lines, 180 km of 220 kV lines, 665 km of 132 kV lines, 8 substations, and auxiliary equipment. Power Transmission Corporation of Uttaranchal, Limited (PTCUL) is the lead project sponsor, and will require around $550 million to support these investments.

3. Distribution

11. The sector roadmap targets 100% village electrification by 2008 and 100% household electrification by 2012, which requires extending the 33 kV and 11 kV distribution networks. The state distribution company, Uttaranchal Power Corporation Limited (UPCL), is implementing a comprehensive system overhaul including energy audits, physical upgrades, expansion of service areas, and improvements in metering, billing, and collection. UPCL's business plan calls for about $370 million in new investment through 2012, which is being met through central Government incentive programs, state budget transfers, and revenue collection from ongoing operations. External financing may be required after the expiration of funds available under the Accelerated Power Development and Reform Program. The company is moving toward fully commercial operations (see Appendix 2), and further restructuring is being considered by GOU, the Uttaranchal Energy Department (UED), and UPCL management.

[9] This figure includes the Tehri and Koteshwar projects, totaling 2,400 MW, which will transmit power directly to the Northern Region grid in Uttar Pradesh. These HPPs are not connected physically to and are not included in the proposed Project.

[10] Central public sector utilities and IPPs are required to give 12% of their generation output to the state as a royalty for the use of the rivers.

4. Policy Framework and Capacity

12. Uttaranchal's power sector was unbundled beginning in 2001, and operations have been rapidly evolving from a system run by regulated monopolies to one incorporating several private groups and more competitive market conditions. A number of reforms have been implemented, and others will be phased in between now and 2012. The Uttaranchal Electricity Regulatory Commission (UERC) actively monitors and promotes reforms to sustain commercial operations. Generation is the most open of the three subsectors, with central public sector utilities and private companies developing several major projects. The transmission sector has some current limitations to private sector involvement, but the policy framework caters for public and/or private initiatives, including joint ventures and wholly owned private sector operations, some of which may come on stream in the short to medium term. As noted above, the distribution subsector is undergoing a system-wide overhaul. Further restructuring will be implemented subject to careful planning and extensive stakeholder consultations. In the meantime, some design, construction, and maintenance operations will be outsourced to the private sector.

13. Capacity to implement the sector roadmap remains a constraint. At the central government level the capacity to formulate and execute policy reforms is sound, and to a large extent already tested, since this is done mainly by the Ministry of Power (MOP) and the Central Electricity Authority (CEA).

14. At the state level, GOU, UED, UERC, and the utilities have strong planning capability. Policy formulation, project definition, project management, and project monitoring will be strengthened over the near term, and ADB intervention includes support for capacity building in these areas. The utilities have the capacity to plan and issue tenders for civil works contracts, the purchase of plant and equipment, and the issuance of concessions, joint ventures, and management contracts. ADB is providing ongoing technical assistance to improve capacity to comply with all relevant ADB policies and procedures.

5. The Asian Development Bank's Strategy in the Power Sector

15. The Asian Development Bank's (ADB's) assistance for the energy sector as outlined in the 2004 and 2005 country strategy and program updates[11] has six main priorities: (i) reforming the power sector; (ii) promoting higher efficiency and low-carbon power sources, for example, run-of-river hydropower projects and renewable energy; (iii) expanding and optimizing transmission and distribution systems; (iv) strengthening institutions to implement reforms required by the 2003 Electricity Act, including the development of more flexible power delivery and trading systems; (v) promoting private sector participation; and (vi) encouraging energy conservation and ensuring environmental and social sustainability. To support the Government's goal of Power For All by 2012, ADB's future strategy for the power sector will be in synergy with the 10th and 11th Development Plans. ADB will continue to expand its promotion of state-level power sector reforms by including more states, such as West Bengal and the northeastern states, and by deepening its efforts in the states in which it is currently active, such as Assam, Kerala, and Madhya Pradesh. The proposed intervention in Uttaranchal is consistent with the strategy of supporting state-level sector reforms, in this case with the emphasis on the generation and transmission subsectors that complement ongoing reforms in the distribution subsector. ADB intervention will promote knowledge transfer in relation to best practices in the international power sector, improve corporate governance in state-owned

[11] ADB. 2004. *Country Strategy and Program Update (2004-2006): India.* Manila; ADB. 2005. *Country Strategy and Program Update (2005-2007): India.* Manila.

utilities, and ensure that appropriate environmental and social safeguards are incorporated into new power sector investments.

6. Lessons Learned

16. In the past, ADB extended assistance to discrete power projects in various states as well as to the central public sector utilities. This strategy enabled ADB to support many projects, but spread ADB's resources too thinly, with the result that desired policy reforms were not achieved. Since 2000, ADB has focused on states committed to reforming and restructuring the power sector to achieve holistic change in macroeconomic management. With the implementation of the 2003 Electricity Act, ADB's focus has shifted toward strengthening system expansion and promoting commercial operations with sector and investment loan support. At the national level, projects supporting the development of interstate transmission systems have been fundamental to ADB's overall energy sector program. ADB's intervention in the transmission subsector has improved commercialization and overall operating efficiencies.

17. The evaluation of two projects[12] provides additional key findings, namely: (i) ADB's energy policy to promote cleaner energy sources and reduce reliance on coal-fired generating capacity is reconfirmed given overall environmental and cost implications, (ii) tariffs can be raised without reducing net project benefits to the poor,[13] (iii) sector restructuring should be implemented gradually rather than in the form of "shock therapy," and (iv) turnkey contracts are preferable to multiple supply and construction contracts in relation to enhancing the efficiency of project implementation.

18. These lessons have been incorporated into the proposed investment design. The investments specifically target clean energy development. Tariff reforms have been initiated, and further tariff changes will be based on commercial principles. Further sector restructuring is based on the current institutional arrangements (new utilities, independent regulatory commission). Procurement packages have been formulated to optimize implementation.

7. External Assistance

19. A major portion of external assistance to India's power sector has come from ADB, the Canadian International Development Agency, the Department for International Development of the United Kingdom, the Japan Bank for International Cooperation, Kreditanstalt für Wiederaufbau of the Government of Germany, the US Agency for International Development (Appendix 3), and World Bank. Uttaranchal has received power sector assistance from the Japan Bank for International Cooperation for the 280 MW Dauliganga hydropower project (through the National Hydropower Development Corporation) and from the Canadian International Development Agency and the Canadian Commercial Corporation for RMU at the 144 MW Chilla HPP.

[12] ADB. 1986. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to India for the North Madras Thermal Power Project.* Manila; ADB. 1989. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to India for the Rayalaseema Thermal Power Project.* Manila.

[13] Poor consumers in rural areas often rely on expensive diesel generator sets and other forms of energy that are costlier than grid-supplied electricity.

8. Policy Context and Dialogue

a. Uttaranchal Power Development Policy, Strategy, and Reforms

20. GOU is committed to sector reforms in conformity with the 2003 Electricity Act and the national electricity policy of February 2005. The latter is intended to promote implementation of the Electricity Act, calling for power for all by 2012 (including rural electrification), reduced T&D and aggregate technical and commercial losses, better cost recovery and targeting of subsidies, greater private sector participation, full development of hydropower, use of information technology for greater operational efficiencies, and protection of consumers' interests (Appendix 2).

21. Uttaranchal has adopted these policy objectives through (i) a memorandum of understanding with the Government of India for unbundling the former SEB; (ii) the implementation of the Accelerated Power Development and Reform Program, which supports local grid strengthening and reduction of system losses; (iii) a tripartite agreement between the state, the central Government, and the Reserve Bank of India for settling accounts between the SEB and its unbundled successors; (iv) the Uttaranchal new industrial policy for economic growth through the development of clean (no- and low-pollution) enterprises, which includes provisions for private sector participation in the power sector; (v) the creation of an independent electricity regulator; (vi) the Accelerated Generation and Supply Program, which provides incentives for RMU of existing power plants; and (vii) a series of tariff orders for generation, transmission, and distribution that support the commercialization of state-owned utilities. The state is implementing the nationwide scheme for accelerating rural and village electrification, the Rajiv Gandhi Grameen Vidyutikaran Yojana,[14] which provides supplemental financing to states to meet the Power For All By 2012 objective.

22. The legislative and policy framework in Uttaranchal is conducive to the commercialization of the power sector in an economically efficient manner. The state is developing hydropower on a least-cost basis to provide improved electric service to all consumers at fair prices and develop an exportable surplus to support economic growth. Restructuring, including the separation of Uttaranchal's grid operations from those of Uttar Pradesh, has improved operational and service efficiency (Appendix 2). Private sector participation is encouraged, but actual investment has been limited to the generation subsector. ADB's intervention will promote economic efficiency and commercial operations.

23. The state power sector has made a transition from the former SEB monopoly to a monopsony,[15] with full regulation of transmission and distribution and limited competition in generation. Further evolution to wholesale competition is being fostered by power trading between generating plants and distribution units. Uttaranchal has power banking and trading arrangements with Delhi, Haryana, and Punjab that take advantage of complementary seasonal surpluses. Currently 15% of generation capacity can be made available to the open market (after fulfilling in-state demand) and dispatch is on a merit order basis (lowest cost of generation gets preferential dispatch).[16] UPCL currently manages the power trading activity. GOU plans to

[14] The Government of India, GOU, and the Rural Electrification Corporation signed a memorandum of Understanding on 23 June 2005 for implementation of this program.

[15] ADB. 2004. Restructuring and Regulatory Reform in the Power Sector: Review of Experience and Issues. Economics and Research Department. Working Paper Series No. 52. Manila.

[16] Given the current in-state balance between supply and demand, a maximum of 15% of UJVNL's output is made available for trading.

incorporate a state-level power trading company in the next few years that will be supported by the ADB intervention.[17]

b. Regulatory System

24. Further to the 2003 Electricity Act, UERC was created as an independent, state-level regulatory agency, legally empowered to operate as an honest broker between the state government, utilities, IPPs, and consumers. Utilities and IPPs (licensees) are required to petition UERC for tariffs, and after consideration of stakeholders' inputs, UERC rules on tariff applications. The resulting tariff orders are the key instrument of regulation and sector governance. Licensees are allowed to appeal the tariff orders, which may eventually be resolved by court rulings. Transmission and distribution systems are currently operated by licensed monopolies (PTCUL and UPCL, respectively). PTCUL acts as a common carrier providing open access to all generating plants. The generation subsector is competitive, with UJVNL, the central public sector utilities, and several IPP companies actively operating, constructing, and developing new power plants.

25. UERC has aggressively implemented the tariff order system, which has been the key driver of restructuring and commercialization, especially in the distribution subsector. UERC has limited professional staff and a single chairperson. It plans to add more officers in the near future, which will improve its professional capabilities. UERC can avail itself of capacity building supported by ADB's intervention (Appendix 4).[18]

c. Tariffs

26. The tariff orders support the rationalization of operating costs and the commercialization of overall system operations. Most important in the Indian context, the tariff orders reflect the official viewpoint that electric power will be provided on a cost of supply basis and that all consumers will pay for electric service. Tariffs include consideration of good governance, financial sustainability, distributive justice, economic efficiency, and fair pricing. The tariff-setting process is consistent with ADB guidance.[19] The tariff orders address inadequate financial management, weak corporate governance, inefficient operation, and obsolete operational procedures, especially in the distribution subsector (Appendix 2).

27. The tariff orders are periodically updated to accommodate adjustments based on the utilities' investment programs, provide a framework for rational pricing structure, and allow a 14% return on equity. Distribution tariffs include lifeline tariffs for poor households and graduated increases in tariffs (25% every 3 months) for unmetered connections. T&D losses are to be reduced by 20% between 2003 and 2008 from 28% to 23%. Universal metering is required.[20] A pricing incentive in the form of a rebate is provided for high-tension industrial customers (connected at 11 kV and above), which account for about 20% of power sales. Time

[17] GOU has commissioned an independent analysis of power sector development at the state level that includes a review of opportunities for power trading as well as of distribution reforms. GOU plans to incorporate an independent power trading company after a daily, year-round power surplus has been established.

[18] UERC plans to expand from its current one officer to three officers in the next year, and additional professional staff are anticipated as well. ADB has included the addition of two officers as an assurance (see para. 77).

[19] ADB. 2003. Setting User Charges for Public Services: Policies and Practice at the Asian Development Bank. *ERD Technical Note Series No. 9.* Manila; ADB. 2004. Beyond Cost Recovery: Setting User Charges for Financial, Economic, and Social Goals. *ERD Technical Note Series No. 10.* Manila.

[20] Installation of advanced electronic metering has resulted in a 10% reduction in T&D losses in some areas.

of day pricing is also extended to these customers (25% surcharge over the base tariff). A rebate is now available for residential consumers who install solar water heating systems.

28. The implementation of new tariff orders has been driving commercialization, but not without resistance from the utilities. UERC has aggressively interpreted the utilities' financial condition and fiscal structure in a manner that has reduced both wholesale and retail tariffs. This has been beneficial to end users and to UPCL, which has realized an increase in its gross margin: in recent years it has been purchasing power at an average price of Rs1.0 per kWh and selling to end users at an average price of Rs2.5 per kWh. UJVNL, which believes that the current tariffs are insufficient to create retained earnings for new investment, has challenged the reduction of the wholesale generating tariffs. UERC believes that the reduced generating tariffs accurately reflect the fact that UJVNL inherited fully amortized and depreciated assets from the former Uttar Pradesh SEB. The uncertainties related to UERC's interpretation of utility financial statements versus cost of supply principles are expected to disappear as new investments begin to dominate utility operations and as UERC and the utilities gain more experience through successive tariff petitions and orders. ADB's intervention will promote reconciliation of tariff issues and rationalization of tariffs, with assurances for cost recovery for ADB-supported investments.

d. Governance

29. The SEB has been unbundled into three limited liability corporations, 100% owned by GOU. UJVNL and PTCUL are relatively new organizations with strong capital structures consisting of low debt and healthy liquidity. UPCL continues to experience large nontechnical losses and has been directed via tariff orders to enact a comprehensive loss reduction program.[21] The utilities' financial and operational performance is expected to improve in the near term.

30. ADB's intervention will support the transition of the generation and transmission utilities from the traditional public utility organizational model, with a large staff handling all business operations, toward an asset management type of structure, with minimum full-time staff and extensive outsourcing of certain functions. An initial step in this transition process is the adoption of turnkey types of contracts for engineering, procurement, and construction of new power system infrastructure. The ADB-supported investments will be the first use of these types of contracts in the state.

31. Corporate management is shifting toward a performance-oriented system with open recruitment for management positions and independent board members. International accounting standards are being practiced or adopted.[22] Billing and collection systems are being upgraded, especially for the distribution company.[23] ADB has sought appropriate assurances to improve overall corporate governance, with capacity building included to support the corporate governance improvements.

[21] UERC has noted that universal metering in the state's three major urban load centers would be the best near-term step for reducing nontechnical losses. UPCL is in the process of installing modern electronic meters and is considering using prepaid metering systems.
[22] Internal audit committees are to be given full autonomy.
[23] UPCL is planning to implement online billing and collection by the end of 2006.

e. Public-Private Sector Development Strategy

32. GOU is cognizant of the need for private investment to meet the sector's overall financing requirements, and has proceeded to use private capital methodically as a complement to government-led investments in a broad public-private partnership, beginning with private participation in generation. UJVNL manages an IPP participation program, with more than 50 out of 99 projects slated for private participation.[24] The response from IPPs has been positive, although limited mainly to domestic firms. The IPP share of new hydropower projects is expected to grow gradually in the near term. UERC has encouraged IPP participation and disputes about tariffs have not emerged.

33. UPCL must improve its overall operating efficiency and financial health before it can commence ownership diversification. PTCUL plans to open selected transmission segments to a competitive bidding process while retaining the role of asset manager. PTCUL may be opened up to private investment pending successful private participation in interstate transmission projects. Recognizing the enormous capital requirements for hydropower development, UJVNL has proposed raising equity in domestic capital markets via a limited public offering, but no timetable for such an offering has been set.

III. INVESTMENT PROPOSAL

34. The Government of India (GOI) and GOU have requested ADB to provide $300 million to partly fund a subset of the investment program covering generation, transmission, and capacity building. This represents a relatively small share of the total funding needs and financing plan. Having ADB as a partner (i) brings down the total cost of funds, (ii) sets out standards in various thematic areas, and (iii) helps to attract other long-term financiers to the sector. GOI and GOU have requested ADB to extend this finance in the form of a multitranche financing facility (MFF).

A. Impact and Outcome

35. ADB will finance part of the Investment Program from 2006 through 2012, resulting in sufficient power capacity to meet all in-state demand and achieve a year-round exportable surplus by 2010.[25] The generation and transmission parts of the Investment Program through 2012, with candidate subprojects highlighted, are presented in Appendix 2. New SHPP capacity will provide additional power to local grids in rural areas and is expected to meet about one third of the projected in-state, nonindustrial power demand at the time of commissioning. Additional power output from the RMU of existing HPPs will be sufficient to meet small- and medium-scale industrial demand at the time of commissioning. The expansion of PTCUL's state-level transmission grid will (i) improve system reliability; (ii) facilitate in-state and interregional power transfers; (iii) facilitate a reduction in overall system losses; (iv) improve the utilization of existing and planned power plants; and (v) promote further development of a national electricity market by connecting to the northern region grid. The total power delivery attributable to the Investment Program will serve more than 12.0 million people in Uttaranchal and the northern region grid

[24] Projects are allocated based on potential risks and financial viability, with more commercially attractive projects designated for IPPs. A two-stage tender process is employed. Following technical prequalification, IPPs submit financial offers, with a specific bid above a predetermined floor price (cost per MW installed). The best financial offer is awarded the project development rights. The IPP then has an incentive to construct and commission the HPP as soon as possible to recover its initial investment.

[25] Interstate power sales will use the lines of the Power Grid Corporation of India, Limited, with actual trading managed by UPCL. Some augmentation of Northern Grid systems may be required to prevent bottlenecks.

service area. Parallel efforts by UPCL in relation to rural electrification and local grid improvements will complement ADB's intervention.

36. The 2003 Electricity Act has created an enabling environment to improve efficiency, support commercialization, and promote private sector participation. The proposed executing agency and implementing agencies have developed a rational sector expansion plan formulated on a least-cost basis. PTCUL and UJVNL, both relatively new companies, have some capacity constraints with respect to donor-funded project implementation (Appendix 4), therefore the proposed interventions include financial support for sector capacity building activities including GOU, UED, the state utilities, and other agencies. Related advisory TA[26] will provide project management support and build capacity in the project management office (PMO) and the project implementation units (PIUs) during the first year of implementation. Additional capacity building activities will be defined in 2006, pursuant to completion of an independent policy analysis being prepared for GOU and UED.

37. The proposed SHPP and RMU investments can be implemented independently of the proposed transmission subprojects, which depend on associated HPPs not financed by ADB. The transmission lines, which require about 3 years to construct, must be ready for initial operation 6 months prior to the commissioning of the associated large HPPs, which require about 5 years to construct. Based on the projected HPP commissioning schedule, the critical transmission system investments will require phased construction of three groups of subprojects and associated HPPs. The first group of subprojects is expected to be completed within 5 years, the second group is expected to be completed within 7 years, and the third group is currently being defined and also is expected to be completed with 7 years. Based on due diligence conducted to date, the capacity of UED and the implementing agencies to use external financing is estimated to be on the order of $40.0 million to $60.0 million per year. This capacity, combined with the associated HPP commissioning schedule, indicates that the proposed Investment Program to be supported by ADB will require 5 to 7 years for full implementation and will require flexibility in subproject selection to achieve the Program's objectives and mitigate the overall investment risk. The MFF modality is ideally suited to this type of investment program.

B. Outputs

38. The ADB-supported subset of the Investment Program will cover the following three areas:

(i) **Clean Energy Development.** Generating capacity will be expanded by the construction of new SHPPs and by energy efficiency improvements at existing grid-connected HPPs. Funding will also be provided for design, construction, and commissioning of a hydrometeorological monitoring system to support statewide hydropower system operations and the planning and design of future hydropower expansion.

(ii) **Transmission System Expansion.** Time-critical transmission lines, substations, and auxiliary equipment will be constructed to evacuate power from new associated HPPs.

(iii) **Capacity Building.** This activity will support capacity building and strengthening of the institutional framework within GOU, UED, and the implementing agencies

[26] The TA for capacity building of the Project Management Office (ADB. 2005. *Technical Assistance to India for the Uttaranchal Power Sector Capacity Building Project.* Manila), originally proposed as a TA attached to the loan, has been processed separately to accelerate project readiness. The TA was approved on 17 August 2005.

to undertake power system expansion activities in a cost-effective manner. It will focus initially on implementation through the PMO and will include (a) training of UED and implementing agency staff to transfer and implement international best practices in transmission, generation, maintenance, and rehabilitation design and operations; (b) consulting services for design and construction management; (c) acquisition of computer hardware and software for the PMO and the PIUs; (d) field supervision, including compliance with safeguards and external monitoring; and (e) corporate development, including advisory services for restructuring, initial design of an independent power trading company, and other activities to be defined in consultation between GOU, UED, and ADB. Appendix 4 presents an initial summary scope of work.

C. Technical Justification and Selection Criteria

39. The long-term generation and transmission expansion program for Uttaranchal has been designed based on national, regional, and state-level least-cost expansion planning led by the Ministry of Power, the Central Electric Authority, UED, UJVNL, PTCUL, and UPCL. The overall expansion program is technically, financially, and economically viable and can be implemented in an environmentally friendly and socially acceptable manner. State-of-the-art technologies and international best practices will be applied to all investments, for example, upgrading from analog to digital control systems, including the System Control and Automated Data Acquisition system for operations; applying global positioning and geographic information systems in route surveys, planning, and design; using tunnels instead of open channel for SHPPs; and upgrading technology during RMU activities. The following are the criteria for selecting each subproject:

(i) Subprojects will be consistent with the overall least-cost expansion plan and will be formulated on a least-cost basis. Subprojects will be technically feasible and will use advanced but proven technologies, with performance-based design consistent with international benchmarks for system efficiency and operational risks. All subprojects will be economically viable and financially sustainable.

(ii) Hydropower subprojects will be part of UJVNL's expansion plans, and scheduling for connection to the transmission system will be coordinated with PTCUL. Transmission subprojects will be part of PTCUL's expansion plans, and scheduling will be consistent with the commissioning of new generating capacity.

(iii) Subproject designs will be consistent with the Environmental Management Plan (EMP), the resettlement framework, and the indigenous peoples development framework (IPDF). Land acquisition and resettlement plans and indigenous peoples development plans based on the agreed IPDF and the resettlement framework will be prepared as necessary for additional subprojects prior to ADB approval for funding.

(iv) All subprojects require environmental assessments in accordance with ADB's *Environment Policy 2002*.[27] Category A and B subprojects will require a summary environmental impact assessment (SEIA) and a summary initial environmental examination (IEE), respectively, to be prepared and made available to the general public 120 days before approval. EMPs with budgets will be prepared for each subproject.

[27] ADB. 2002. *Environment Policy*. Manila.

D. Special Features

1. Carbon Emissions Trading

40. The clean energy investments may qualify for greenhouse gas emission reductions, or carbon credit, trading under the Kyoto Protocol's Clean Development Mechanism (CDM). The CDM is one of three flexible mechanisms[28] established by the Kyoto Protocol aimed at cost-effectively reducing global emissions of greenhouse gases. The CDM is a market-based financial instrument with the dual purpose of assisting developing nations to achieve sustainable development and industrial countries to meet their emission reduction targets. The CDM allows industrial countries to invest in "clean" projects in developing countries, for example, renewable energy such as hydropower, energy efficiency, and waste management, and to acquire certified emission reductions[29]—generically referred to as "carbon credits"—that can be used to comply with the Kyoto Protocol. ADB has provided base financing for three CDM projects[30] with pending carbon credit transactions, and is currently developing several more projects with CDM potential. ADB's CDM facility provides parallel assistance to projects that can qualify for CDM and to facilitate agreements between sellers, or project owners, and buyers of carbon credits.[31]

41. ADB has been providing active assistance with further definition and qualification of the potential CDM opportunities since early 2005.[32] Based on experience in neighboring Himachal Pradesh, the SHPP subprojects are highly likely to qualify for the CDM. Based on previous projects supported by ADB, the CDM-related revenue is expected to generate undiscounted financial returns of at least 10 to 15% of project costs. The CDM facility recently solicited carbon credit bids for a subcomponent of the Liaoning Environment Improvement Project (see footnote 30) of more than $10 per ton of carbon dioxide equivalent, compared with typical offers of around $5 per ton of carbon dioxide equivalent being offered by the World Bank's CDM funds. Given the potential financial upside, ADB is continuing to explore other opportunities for carbon credit revenue in the investment program.

2. Renewable Energy Services

42. The Uttaranchal Renewal Energy Development Agency has requested ADB support for a broad range of renewable energy development activities, including commercialization of biofuel production, after-market solar energy services, and mini- and micro-hydropower expansion for rural and off-grid applications. The Global Environment Facility has responded

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[28] The other two mechanisms are Emissions Trading and Joint Implementation.

[29] Certified emission reductions are the official commodity generated by CDM projects. One certified emission reduction equals 1 ton of carbon dioxide equivalent.

[30] ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for the Gansu Clean Energy Development Project.* Manila; ADB. 2004. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for the Liaoning Environmental Improvement Project.* Manila; ADB. 2004. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for the Coal Mine Methane Development Project.* Manila.

[31] Details can be found at http://www.adb.org/cdmf.

[32] If the SHPP investments are not feasible or do not qualify for the CDM, selling emission reduction credits in the second-tier, or voluntary, markets may be possible. Uttaranchal has been proposed for inclusion as a focus state for which implementation is expected to begin in late 2005 (ADB. 2004. *Technical Assistance to India for the Capacity Building for Clean Development Mechanism in India.* Manila). The executing agency for this TA is the Ministry of Environment and Forests, which is also India's National Designated Authority for Clean Development Mechanism. UJVNL has requested assistance from ADB to evaluate the feasibility of developing advanced technology to convert excess power from run-of-river plants to other usable forms of energy, for example, hydrogen can be produced from water via electrolysis, then used to power fuel cells.

positively to a preliminary concept paper for a parallel project to support these activities. Further development of the concept paper is in progress. A grant to the Uttaranchal Renewal Energy Development Agency for accelerated upgrading of micro-hydropower facilities has been approved from ADB's regional TA for the Poverty and Environment Program.[33] The grant will partly finance watermill users' associations, with the objective of commercializing locally-owned facilities that produce mechanical and electric power.

E. Cost Estimates and Financing Plan

43. The Investment Program from 2006–2012, including cost estimates and financing sources, is presented in the table. Indicative cost estimates for appraised subprojects are presented in Appendix 5.[34]

Uttaranchal Power Sector Investment Program, 2006–2012

Investment Program 2006–2012	$ Million
Generation	
UJVNL Large Hydropower	700
UJVNL Small Hydropower	335
Central Public Sector Utility and/or Independent Power Companies	3,200
Transmission	550
Distribution	370
Total	**5,155**
Financing Plan	
Domestic	
UJVNL	440
PTCUL	100
UPCL	40
GOU	580
Central Power Sector Utilities	1,600
Private Sector	750
Power Finance Corporation	300
Local Banks, Private Equity, and Capital Markets	245
International	
ADB	300
Bilaterals	300
International Financial Institutions	500
Total	**5,155**

Sources: ADB, Power Transmission Corporation of Uttaranchal, Limited, UJVNL, Uttaranchal Power Corporation, Limited, and UED.

44. The Government has requested financing up to an equivalent of $300.0 million from ADB's ordinary capital resources to help finance part of the Investment Program. The financing will be provided under a MFF in accordance with ADB policy.[35] The MFF will extend multiple loans to finance a range of projects under the Investment Program, subject to the submission of a related periodic financing request (PFR) by the Government and execution of the related loan and project agreements. The Government has entered into a FFA with ADB. The FFA satisfies

[33] ADB. 2003. ADB. *Technical Assistance for the Poverty and Environment Program.* Manila.

[34] ADB loans will finance up to 70% of total subproject costs. Contingencies and interest during construction are included in the detailed cost estimates, but interest during construction will not be capitalized in the individual loans.

[35] ADB. 2005. *Pilot Financing Instruments and Modalities*. Manila.

the requirements set forth in Appendix 4 of the Pilot Financing Instruments and Modalities (see footnote 35). The Government is required to comply with the FFA requirements. Pursuant to the FFA, the Government has submitted to ADB the first PFR in the amount of $26.5 million. The first PFR is presented to the Board, together with the FFA. The loans under the MFF will finance civil works, equipment supply and erection, consulting services, and other capacity building activities. The minimum amount of a loan request will be $25.0 million. All of the provisions of the ordinary operations loan regulations applicable to London interbank offered rate (LIBOR)-based loans[36] will apply to each loan, subject to any modifications that may be included under any loan agreement. The Government has the option to choose between eligible currencies and the interest rate regime for each loan. The specific terms of each loan will be based on the related PFR with interest to be determined in accordance with ADB's LIBOR-based lending facility. The Government has provided ADB with (i) the reasons for its decisions to borrow under ADB's LIBOR-based lending facility, and (ii) an undertaking that these choices were its own independent decision and not made in reliance on any communication or advice from ADB.

45. In case the Government requests any cofinancing arrangements or related assistance for projects under the MFF from ADB, these may be assisted by ADB, subject to related ADB policy and procedures.

46. The Government will provide the proceeds of the loans under the MFF in local currency to the state and through the state to UED and the implementing agencies. The Government will bear the foreign exchange risk on the loans.

F. Implementation Arrangements

1. The Executing and Implementing Agencies

47. UED will be the executing agency. UJVNL will be the implementing agency for the clean energy development subprojects; PTCUL will be the implementing agency for the transmission system expansion subprojects; and UED, through the PMO, will be the implementing agency for capacity building. The PMO staff shall include representatives of UJVNL, PTCUL, and UED and other GOU departments. The implementation organization is shown in Appendix 6, which highlights the functional responsibilities of the PMO and the PIUs.

2. Program Management

48. The investments supported by ADB will follow sector loan implementation procedures. UED and the implementing agencies will appraise additional subprojects following approval of the MFF. The implementing agencies will undertake detailed design, procurement, construction supervision, commissioning, maintenance, and operation of the subprojects. Technical support from consultants and contractors will be employed as necessary with funding from the capacity building budget. UED and the implementing agencies will liaise with ADB on a regular basis.

49. The PMO, through the related implementing agency offices, will be responsible for processing and implementing the subprojects. It will be assisted by technical experts who will evaluate the technical reports, feasibility studies, preliminary design reports, environmental assessment reports (including the EMP with budget), resettlement and indigenous peoples development plans, and detailed design reports to ensure compliance with ADB and

[36] ADB. 2001. *Ordinary Operations Loan Regulations Applicable to LIBOR-Based Loans Made from ADB's Ordinary Capital Resources*. Manila.

Government requirements. Summary appraisal reports will be submitted to ADB subsequent to UED approval and required Government clearances. The PMO will prepare progress reports and submit them to ADB on a quarterly basis and will submit other required performance and monitoring reports twice a year.[37]

50. Overall progress and compliance with conditions of the FFA and individual loan agreements will be monitored on a regular basis with periodic reports to ADB, consistent with existing project implementation requirements. Reports will include evaluation of issues or problems faced by the executing agencies and recommended remedial actions. Overall investment progress will be considered as new financing requests are submitted. ADB management and staff will report regularly to ADB's Board of Directors on the implementation of the MFF funded activities. Board Information Reports will be submitted on an annual basis or more frequently if necessary.

3. Implementation Period

51. The Investment Program will be implemented over 7 years, inclusive of procurement and construction activities, and will be completed by January 2013. Each loan agreement is expected to have a utilization period of 5 years. The indicative implementation schedule for the appraised subprojects is presented in Appendix 7.

4. Procurement and Consulting Services

52. Equipment and materials to be financed under the loan will be procured in accordance with ADB's *Guidelines for Procurement*. International competitive bidding will be used for civil works contracts with an estimated value equivalent to or more than $10.0 million, for turnkey contracts,[38] and for supply contracts estimated to cost the equivalent of or more than $1.0 million. International shopping or local competitive bidding will be used for contracts estimated at $100,000 to $1.0 million and direct purchase will be used for contracts worth less than $100,000. Contract packages will be prepared to ensure maximum competition under international competitive bidding. Similar contractual arrangements and specifications will be applied to other subprojects. Indicative procurement packages are presented in Appendix 8. Web-based procurement will be used to the maximum extent possible following procedures acceptable to ADB.[39] Consulting services will be procured in accordance with ADB's *Guidelines on the Use of Consultants by Asian Development Bank and Its Borrowers*. Services will be provided through a firm or firms recruited and engaged under international competitive bidding procedures using the quality- and cost-based selection method and simplified technical proposals. For specialized tasks with a contract value less than $100,000, individual experts may be recruited based on biodata submitted in response to specific terms of reference for the assignment.

[37] In accordance with ADB's policy on public communications (2005), project reports will be made available to the public.

[38] Most proposed subprojects will utilize turnkey types of contracts. This will be the first time that PTCUL and UJVNL will use turnkey procurement for SHPP, RMU, and transmission investments.

[39] UJVNL has implemented a web-based procurement system. Project Coordination and Procurement Division of the Central Operations Services Office will be consulted on further e-procurement.

5. Disbursement Arrangements

53. The individual loan proceeds will be disbursed in accordance with ADB's *Loan Disbursement Handbook* and ADB's *Interim Guidelines for Disbursement Operations, LIBOR-Based Loan Products*, both as amended from time to time.

6. Advanced Procurement and Retroactive Financing

54. Advanced procurement was approved in July 2005. Draft prequalification and bidding documents have been prepared for contract packages covering 2 clean energy subprojects and 5 transmission subprojects. The Government has requested that retroactive financing be made available for time-critical expenditures necessary to expedite subprojects implementation. ADB has advised that retroactive financing of expenditures incurred from 12 months prior to signing the corresponding loan agreement, with a ceiling up to 20% of the loan amount, may be available for individual loans under the proposed MFF. The Government and GOU have been informed that approval of advanced procurement action and retroactive financing does not commit ADB to finance any of the proposed subprojects.

7. Anticorruption Policy

55. ADB's anticorruption policy was explained to and discussed with the Government, GOU, and the implementing agencies. Consistent with its commitment to good governance, accountability, and transparency, ADB reserves the right to investigate, directly or through its agents, any alleged corrupt, fraudulent, collusive, or coercive practices relating to projects under the MFF. To support these efforts, relevant provisions of ADB's anticorruption policy are included in the loan regulations and the bidding documents for the Investment Program. In particular, all contracts financed by ADB in connection with projects under the MFF will include provisions specifying ADB's right to audit and examine the records and accounts of UED and all contractors, suppliers, and consultants and other service providers as they relate to the projects under the MFF.

8. Accounting, Auditing, and Reporting

56. Quarterly progress reports will be prepared for the individual loans and subprojects for submittal to ADB. The reports will include a description of physical progress, problems, and difficulties encountered and a summary of financial accounts that will consist of loan expenditures during the period, year to date, and total to date. A project completion report will be submitted within 3 months following completion of each loan. PTCUL and UJVNL will maintain separate accounts for each loan. Within 6 months of the close of the financial year, UED, PTCUL, and UJVNL will submit annual pro forma project accounts and un-audited financial statements for UED and the implementing agencies, and will submit audited accounts and financial statements within 9 months of the close of the financial year. PTCUL and UJVNL will continue the practice of hiring independent auditors to audit their annual financial statements and annual project accounts on a schedule to be agreed by the Government and ADB. The auditors will submit their report together with the respective annual financial statements and annual project accounts reports.

9. Performance Monitoring and Evaluation

57. The PMO, with inputs from PTCUL, UJVNL, and UED, will prepare quarterly progress reports and submit these to ADB within 45 days of the end of each quarter. These reports will

provide (i) a narrative description of progress made during the period, (ii) changes in the implementation schedule, (iii) problems or difficulties encountered, and (iv) work to be carried out in the next period. The progress reports will also include a summary financial account for the project components, including subprojects, consisting of project expenditures during the period, total expenditure to date, and benefit monitoring in accordance with procedures and details acceptable to ADB. Performance will be evaluated on the basis of indicators and targets stipulated in the design and monitoring framework. The ADB project team will prepare periodic reports to inform the ADB Board of Directors of overall progress. A Board information report will be submitted annually, and supplemental progress reports will be submitted prior to management approval of individual loan agreements.

10. Review

58. ADB will field an inception mission within 3 months of the first loan approval. ADB will review the implementation and operations based on quarterly progress reports and meet with UED and the Government semiannually to discuss implementation progress. A midterm review to be carried out 2 years after loan effectiveness will focus on the engineering, resettlement, and environmental aspects of the ADB-supported investments and review the financial status of PTCUL and UJVNL. Representatives of ADB, UED, and the implementing agencies will take part in the review. The review will allow for any necessary midcourse corrections to ensure successful implementation and achievement of objectives. A project completion report will be submitted within 3 months following completion of the individual loans. A facility completion report will be prepared after the completion of all ADB-supported activities and subprojects.

IV. BENEFITS, IMPACTS, ASSUMPTIONS, AND RISKS

59. Candidate subprojects that have been appraised by ADB and GOU include new SHPPs, RMU of existing HPPs, a hydrometeorological monitoring system to support generation operations, and new transmission lines and substations to evacuate power from five new HPPs. The candidate generation and transmission subprojects are presented in Appendix 2, Table A2.4. Indicative cost estimates for the appraised subprojects are presented in Appendix 5.

60. Capacity building activities will be implemented as separate subprojects. The initial subproject will cover consulting services for design, procurement, construction management, and implementation of environmental and social safeguards (see Appendix 4). Additional subprojects for corporate development, incorporation of a power trading company, and other sector reforms will be defined in consultation between ADB, GOU, and UED.

61. The financial analyses were carried out on an individual subproject basis, whereas economic analysis was conducted using an integrated, macro time-slice approach. The proposed investment is based on a least-cost expansion plan for generation and transmission.

A. Financial Analysis

62. The institutional and subproject financial evaluations have been carried out in accordance with the *Guidelines for the Financial Governance and Management of Investment Projects Financed by the Asian Development Bank.* The analyses cover the period from FY2005–2006 to FY2025–2026. Financial viability was examined by comparing the incremental costs and benefits under with and without investment scenarios in real terms using constant FY2004–2005 prices. In calculating the forecast energy tariffs and wheeling charges for the

different project components, UERC regulations[40] on tariff determination for energy generation and transmission services were applied as appropriate. UERC's regulations are modeled on the Central Electricity Regulatory Commission's regulations, which allow for full cost recovery, including capital costs (at a debt to equity ratio of up to 70:30), depreciation, 14% return on equity, and interest at actual cost. Operating costs are fully recoverable for prudent levels of expenditures and are generally based on accepted benchmark allowances or historical performance. There is also potential for higher returns from generation under Ministry of Power rules that permit 15% or more of UJVNL's production to be sold on the open market, where peak supplies command a premium. The financial internal rates of return (FIRRs) for clean energy and transmission investments were calculated on an after tax basis and indicate that the core subprojects are financially viable. The resulting FIRRs compare favorably with the weighted average cost of capital of 4.36%. The FIRR for clean energy subprojects is 4.8%, and for transmission subprojects is 7.4%. The detailed projected financial performance for each company is presented in Appendix 9. A summary of financial analyses, including sensitivity analyses and risk assessment, is presented in Appendix 10 and Supplementary Appendix B.

B. Economic Analysis

63. The economic analysis reviews power sector policies, demand and supply forecasts, and least-cost system planning methodologies and includes a cost-benefit study. The demand and supply review shows that India in general, and the Northern Region in particular, suffer from chronic supply shortages and that the project investments are justified based on forecast demand and supply considerations. The Investment Program will partly generate benefits in the form of resource cost saving by displacing investments in coal-fired and gas-fired power plants and will partly meet incremental demands for electric power. Cost-benefit analysis shows that hydropower is cheaper than the displaced thermal power and that the advantage is strengthened when the environmental benefits of avoided carbon dioxide emissions are taken into account. The benefits of the incremental consumption were estimated by developing a demand function for the household sector that calculates domestic consumers' willingness to pay for incremental supply and by assuming that for other consumer categories, the tariff is a conservative proxy for their willingness to pay. The economic cost-benefit analysis results in an economic internal rate of return of 21% for the base case, and when environmental benefits are added increases to 28%. The sensitivity analyses show that the Investment Program remains justified should various risks materialize, but is sensitive to reductions in demand. However, low demand is considered a relatively small risk given India's long history of unmet demand. The detailed analysis is provided in Appendix 11.

C. Social Aspects

64. Based on the findings of an initial poverty reduction and social assessment, a summary poverty reduction and social strategy was developed. During Investment Program design, participatory approaches were undertaken, including consultations with representatives of communities, local governments, and other stakeholders. A summary poverty reduction and social strategy is presented in Appendix 12.

65. **Appraised Subprojects**. A full Resettlement Plan was prepared for the first and second groups of subprojects appraised by ADB and GOU in accordance with ADB's *Policy on Involuntary Resettlement*. Entitlements in the Resettlement Plan are consistent with those in the

[40] Uttaranchal Electricity Regulatory Commission Regulations. 2004. *Terms and Conditions for Determination of Hydro Generation Tariff and Terms and Conditions for Determination of Transmission Tariff.* India.

entitlement matrix of the summary resettlement framework (Appendix 13). According to the Resettlement Plan, the expansion of transmission systems will require 8.03 hectares (ha) of permanent land acquisition and 179.21 ha of temporary acquisition from private owners.[41] In addition, 16.03 ha of public land will also be acquired. SHPPs will require 3.12 ha of permanent acquisition from private owners and no temporary acquisition plus 10.87 ha of public land. RMU and institutional strengthening will not involve land acquisition and resettlement. Land acquisition and resettlement resulting from core subprojects will affect 25 households on a permanent basis and 229 on a temporary basis. None of the components will involve any loss of structures.

66. The Resettlement Plan provides details on the impacts of appraised subprojects. All affected people will be provided with compensation and resettlement assistance if their land is permanently or temporarily acquired;[42] their income sources are adversely affected; and their crops, trees, and other facilities or access to properties are damaged or reduced because of the Subprojects. A lack of legal documents pertaining to their customary rights of occupancy or of titles does not affect affected people's eligibility for compensation. In addition to compensation payments in accordance with the Land Acquisition Act, those affected will receive additional assistance to match replacement costs for lost land; the transaction costs, including stamps and registration costs, for the purchase of replacement land; and other forms of resettlement assistance, such as transition allowances and agricultural inputs for reestablishing crops. Losses of profits and income because of property losses or loss of access to property, regardless of whether or not the affected person has title to the land, will be compensated. To restore income losses, compensation for lost workdays and/or income and training will be provided to affected people. Short-term training will be provided by engaging non-government agencies where feasible.

67. Detailed field work to assess the socioeconomic profile of affected people did not find scheduled tribes or indigenous people in the subproject areas, thus the Investment Program is not expected to affect indigenous people negatively or differentially. Socioeconomic data indicate the presence of vulnerable groups, and provisions to address impacts on these groups have been made in the Resettlement Plan and resettlement framework. Special assistance to vulnerable groups includes prioritization in land-for-land compensation schemes; additional allowances for house reconstruction, relocation, and income losses; specialized training; and priority for employment in subproject activities.

68. **Other Subprojects**. A resettlement framework and an IPDF were prepared and will serve as a basis for preparing subsequent resettlement plans and IPDFs for additional subprojects as required. All plans will be prepared in full consultation with affected people and will be disclosed to them in draft form. The resettlement framework and IPDF will be placed on ADBs web site.

D. Poverty Analysis

69. Uttaranchal is one of India's poorest states. In 2002, the per capita net state domestic product was Rs13,000, compared with the national average of Rs18,000. A recent survey found

[41] Of 179 ha temporarily acquired, owners will be compensated for lost agricultural income for an estimated 115 ha of agricultural land.

[42] Temporary acquisition for the storage of construction materials and equipment for substations, SHPPs, and RMU in relation to core subprojects will involve government land. For temporary acquisition of private agricultural land, affected persons will be provided compensation for lost agricultural income.

that 36% of rural families in Uttaranchal are below the poverty line. Poverty is unevenly distributed throughout the state, with pockets of extreme poverty located in interior rural areas.

70. The Investment Program is expected to result in more efficient and reliable delivery of electric services. Poor and vulnerable consumers, including hospitals, schools, and other social utilities, which are often hardest hit by inadequate power supply, load shedding, and poor power quality, will benefit directly from the investments. Direct positive economic and social benefits will result from the subprojects. Power generated by SHPPs will be connected to the local grid at 33 kV, increasing local grid capacity and bringing the benefits of electricity, which include better health care, sanitation, education, greater income-earning opportunities, and higher living standards, to remote communities. RMU activities will provide more reliable power to the existing grid.

71. The Investment Program is expected to create new full-time employment opportunities. For civil works in relation to SHPP and RMU investments, 160 and 240 unskilled workers, respectively, will be hired for a period of 3 years. For the civil works related to transmission lines, about 650 unskilled local workers will be hired for a period of 18 months. Improved power supplies will induce light industrial and commercial activity, creating employment opportunities and improving productivity and the quality of outputs in the manufacturing and agriculture sectors. Indirect positive impacts will result from exports of power to the northern region grid, allowing GOU to generate income that can be targeted specifically for social development in the state, particularly for the poor.

E. Environmental Assessment

72. The SHPPs are classified as Category A,[43] the transmission subprojects are classified as Category B, and the RMU and hydrology subprojects are classified as Category C. Considering the potential cumulative impacts of the overall generation and transmission expansion program, including associated HPPs not financed by ADB, the Investment Program has been assigned Category A in accordance with ADB's *Environment Policy 2002* (see footnote 27). Environmental impact assessments were prepared for the SHPPs and an IEE was prepared for the transmission lines and substations. An SEIA, including an environmental assessment and review framework, and an EMP (with budget) were prepared based on the environmental impact assessments and IEE. Two rounds of public consultation were conducted that indicated broad support for the Project based on expected economic and social benefits. The SEIA was circulated to ADB's Board on 20 May 2005 and was translated and made available to affected people in the project area. An environmental sector assessment was submitted to ADB on 17 June 2005. The findings and conclusions of the sector assessment are consistent with the SEIA, namely, the investment benefits far outweigh negative impacts and the negative impacts can be mitigated in a cost-effective manner. Four broad alternatives have been considered: (i) no action, that is, importing power from the northern region grid; (ii) expansion of coal-fired power in the eastern region, coupled with interstate transmission expansion to wheel power to the northern region grid; (iii) construction of a relatively small number of large storage dams in Uttaranchal; and (iv) relatively smaller run-of-river plants as in the proposed integrated generation and transmission expansion program. Alternative (iv) is preferred on the basis of national policy, economic analysis, environmental and social costs, and gestation period.[44]

[43] Taken in isolation, the individual SHPPs could be assigned environment Category B.

[44] Given the 25-year gestation period of the Tehri dam project, GOU adopted an informal policy of avoiding large storage dams in favor of run-of-river designs.

73. Based on the environmental assessments and reconnaissance surveys, most of the impacts will occur during construction. The SHPPs use trench weirs instead of dams, a design feature that ensures the maintenance of minimum river flow. The rivers are non-navigable, no commercial or subsistence fisheries are located in the investment program area, and rural and village water use will not be affected. The principal impacts are clearance of vegetation, management of excavation soil and rock, and reduction in water flow in short sections of small rivers. These impacts will be mitigated by appropriate erosion control measures, re-use of excavation wastes wherever possible, controlled disposal of residual excavation wastes, and provision of compensation for reforestation at a ratio of 2 ha of forest land for each hectare taken by the subprojects. No endangered, rare, or threatened species of flora or fauna have been reported at any subproject sites. Adequate provisions have been made for the environmental mitigation and monitoring requirements and their associated costs. The Investment Program will have a small "footprint": the maximum amount of land directly affected by all subproject components is less than 12 square kilometers out of a total program area larger than 51,000 square kilometers. The subproject sites are located mostly on land owned by GOU. The land acquired for new substations is mostly uninhabited and unused land located outside towns and villages. Mitigation measures related to construction and specified in the EMP will be incorporated into civil works contracts. Implementation of mitigation during construction will be primarily a responsibility of the contractors, but the implementing agencies will be responsible for overall implementation of site-specific EMPs.

74. The overall objective of expanding clean energy capacity will generate local, regional, and global environmental benefits. Local air quality, particularly indoor air quality, will improve because of the substitution of electricity for biomass (animal dung and wood) and kerosene. Regional air quality will be preserved by offsetting the expansion of thermal generating capacity. Global greenhouse gas reductions will also accrue by offsetting increases in thermal power capacity.[45]

F. Potential Risks

75. Risks include (i) tariffs set below cost-recovery levels, rendering the subprojects and the Investment Program financially nonviable; (ii) delays in power sector reforms; (iii) delays in regulatory approvals for transmission line rights-of-way; (iv) delays in construction of associated HPPs not financed by ADB; (v) increases in the prices of cement, steel, and other raw materials that would render the investments financially nonviable; (vi) failure to mobilize the necessary counterpart funds; and (vii) delays in procurement and contract awards. All these risks are low or have been minimized to the extent possible in that tariff setting on new plants employs a transparent formula based on cost of supply principles, GOU is committed to ongoing sector reforms, regulatory approval for rights-of-way is in progress, approximately half of the key associated HPPs are at an advanced design stage or are under construction, raw material prices are expected to stabilize or decrease during the implementation period, and GOU has confirmed that counterpart funds will be available.

V. ASSURANCES

76. In addition to the standard assurances, the Government and GOU have given the following assurances, which have largely been incorporated in the Framework Financing Agreement, and will be incorporated in the individual loan agreement and project agreement(s)

[45] As noted in para. 41 the SHPPs are expected to qualify for emissions trading under the CDM.

as applicable and mutually agreed between the Government and ADB for each Project under the MFF.

77. **Sector Reforms.** GOU will ensure that its three power utility companies—UJVNL, PTCUL and UPCL—will conform to the tariff orders issued from time to time by UERC to ensure reduced T&D losses, rational power pricing, and graduated increase in tariffs as determined by UERC. PTCUL and UJVNL will file tariff applications with UERC in a timely manner. The Government and GOU will continue to emphasize and support the autonomy of PTCUL, UJVNL, and UPCL with respect to commercial, administrative, and operational activities. As required by the Government, GOU will enact fiscal responsibility and budget management legislation to eliminate its revenue deficit by FY2008. GOU will appoint two additional members to UERC as planned by the end of 2006. PTCUL will appoint at least two independent directors by the end of 2007.

78. **Management and Implementation**. PTCUL and UJVNL will be responsible for planning, design, and procurement. The PMO will have primary responsibility for program coordination. UED, PTCUL, and UJVNL will ensure timely and adequate provision of counterpart funds.

79. **Financial Governance.** In accordance with tariff orders issued by UERC, GOU through UED shall ensure that PTCUL and UJVNL maintain the following financial management objectives from FY2006–2007:

(i) debt-service coverage ratio of not less than 1.2, and
(ii) accounts receivable of no more than 2 months of billing.

80. **Financial Management.** Internal controls will be strengthened to be consistent with international standards by setting up and maintaining independent and autonomous internal audit departments in the implementing agencies. The implementing agencies will adopt computerized accounting and management information systems, including online billing and collection systems, where appropriate and practical, by the end of 2007.

81. **Environmental.** GOU through UED will ensure that PTCUL and UJVNL will ensure that the proposed investments under the MFF are undertaken and that all subproject facilities are operated and maintained in accordance with all applicable laws, rules, and regulations of the Government and ADB's *Environment Policy 2002* (footnote 27)*,* as amended from time to time. For each subproject, PTCUL and UJVNL will prepare and implement the necessary IEE, environmental impact assessment, and EMP (with budget) in accordance with the environmental assessment and review framework. For subprojects not defined prior to approval of the MFF, the environmental categorization and assessment procedures defined in the environmental assessment and review framework will be followed as part of subproject appraisal. For any category A or B subprojects, an SEIA or IEE will be prepared and made available to the public 120 days in advance of subproject approval following ADB implementation procedures for sector loans. PTCUL and UJVNL will monitor, audit, and report to ADB twice a year on the implementation of the EMPs for each subproject. UED will verify that all associated hydropower projects not financed by ADB will be constructed and commissioned in compliance with the laws and regulations of India prior to connecting such facilities to the ADB-supported transmission network.

82. **Social.** GOU through UED will ensure that PTCUL and UJVNL will ensure that all land and rights-of-way required by the subprojects will be made available in a timely manner and that

the provisions of the resettlement framework and any necessary resettlement plans, including compensation and entitlements for affected households and people, will be implemented in conformity with all applicable laws and regulations of the Government and GOU, including as amended from time to time, the entitlement benefits as listed in the Government's *National Policy on Resettlement and Rehabilitation*, published in February 2004, and ADB's *Policy on Involuntary Resettlement 1995,* and the agreed resettlement framework and Resettlement Plan. PTCUL and UJVNL will ensure that people affected by each subproject are consulted and fairly compensated in a timely manner on a replacement value basis in accordance with the related resettlement plans and resettlement framework, such that their living standards are not adversely affected. PTCUL and UJVNL will submit progress and completion reports on land acquisition and resettlement as part of the quarterly progress reports for each subproject. Similarly, if necessary, an indigenous peoples development plan will be prepared in accordance with the IPDF. PTCUL and UJVNL will engage independent external experts for monitoring and grievance redress mechanisms to address any grievances of affected people on resettlement, environment, and other social issues.

83. GOU through UED will ensure that contracts under each Project follow all applicable labor laws of the Government and GOU and that these further include provisions to the effect that contractors (i) do not use children as labor, and (ii) follow legally mandated provisions of labor (including equal pay for equal work), health, safety, sanitation, welfare and working conditions. The contracts will also include clauses for termination in case of any breach of these provisions by contractors.

VI. RECOMMENDATION

84. I am satisfied that the proposed multitranche financing facility would comply with the Articles of Agreement of ADB and recommend that the Board approve the provision of loans under the multitranche financing facility in an aggregate principal amount not exceeding $300,000,000 equivalent to India for the Uttaranchal Power Sector Investment Program from ADB's ordinary capital resources, with interest to be determined in accordance with ADB's LIBOR-based lending facility, and such other terms and conditions as are substantially in accordance with those set forth in the Framework Financing Agreement presented to the Board.

Haruhiko Kuroda
President

8 March 2006

DESIGN AND MONITORING FRAMEWORK

1. Investment Program

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
Impact Contribute to economic development in Uttaranchal and the northern region of India through expanded power supply at competitive prices.	Relative to a 2004 baseline, increase in gross energy output of 10% per year, sufficient to serve 600,000 people at current consumption rates Increase in in-state service connections and power sales Year-round, daily exportable surplus by 2012 sufficient to serve 12.0 million people at current consumption rates State-level gross domestic product growth in Uttaranchal and customer states Poverty reduction facilitated through village and rural electrification programs	Policy dialogue, project progress reports, reports from state utility companies and the regulatory commission, and loan review missions Electricity sales data from utilities; gross domestic product data broken down by residential, commercial, and industrial categories	
Outcome Clean Energy Development: (i) expansion of the electric power service area and improvements in the reliability and quality of supply; and (ii) promotion of energy efficiency by renovating, modernizing, and upgrading existing hydropower plants Transmission Expansion: New associated hydropower plants connected to the state's grid and the northern region grid within 6 months of commissioning	Provision of sufficient power supplies to serve the majority of the consumers living below the poverty line in the districts of Uttarkashi and Rudraprayag Provision of incremental power supplies to serve 151,000 consumers in the Haridwar service area Evacuation of 21,900 gigawatt-hours per year of generating capacity to the state grid (5,000 MW running at 50% load factor) by 201. Meet in-state demand and	Project progress reports, reports from state utility companies and regulatory commission	**Assumptions** • Stable economic growth • Continued evolution of an enabling policy framework and regulations to facilitate the commercialization of utility company operations • Level playing field between state-level utilities, central public sector utilities, and independent power producers **Risks** • Delays in power sector reforms • Tariffs set below cost-recovery levels • Generating capacity, including associated facilities not financed by ADB, not commissioned in a timely manner • Delays in transmission system construction

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
	create an exportable surplus by 2010. Total system generation capacity increase of 2,000 MW by 2011 and an additional 2,000 MW by 2013. Increase in the quality and reliability of supply (45% decrease in load shedding from 2005 to 2010).		
Capacity Building: Sector sustainability resulting from continued reforms and improvements in operational efficiency	Compliance with tariff orders, including reduction in aggregate technical and commercial losses to international benchmarks (10–15%) Improvements in metering, billing, collection, revenue management, and collection of arrears Utilities to maintain debt-service coverage ratio of not less than 1.2, accounts receivable of no more than 2 months of billings Adoption and strengthening of financial management via independent audit departments, computerized accounting and management information systems, and development of online billing and collection systems where appropriate and practical	New tariff orders and resolution of challenges to existing tariff orders	**Assumption** • Government continues to support sector reforms and utility restructuring
Outputs Clean Energy Development: New small hydropower plants. Energy efficiency improvements by renovating, modernizing, and upgrading existing hydropower plants Development of hydrometeorological	29 MW of new generating capacity at 60% load factor by 2010. 10 MW of incremental output at minimum 60% load factor by 2010 Improved efficiency of generation system,	Policy dialogue, project progress reports, reports from state utility companies and the regulatory commission, loan review missions Implementation progress report and loan review missions Review of tender documents Payment certificates for	**Assumption** • Counterpart funds for operation and maintenance of project components made available **Risks** • Regulatory approval for rights-of-way in forest areas is not obtained in a timely manner • Increase in prices of raw materials and fuel for construction operations

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
monitoring network Transmission Expansion: Construction of eight high-voltage transmission lines and associated substations Capacity Building: Training of the Uttaranchal Energy Department and implementing agencies' staff for project management and implementation; development of human resource management program; upgrading of information technology systems Design of state-level power trading company	reduced flood damage to hydropower facilities, reduced operation and maintenance costs by 2010 Additional wheeling capacity (target: 420 kilometers of new lines, 2 new substations by 2010) Fully staffed project management office and project implementation units by January 2007 Consultant services mobilized by mid-2006 Number of workshops held and number of people trained Corporate human resource programs in place by the first quarter of 2007 Initial information technology system improvements by the end of 2006, with long-term system upgrades defined by the first quarter of 2007 Incorporation and operation of an independent power trading company by 2010.	contracts Review of project accounts Summary appraisal reports, including summary environmental impact assessment, resettlement plans, and indigenous peoples development frameworks, if needed, for each subproject Review of tender documents and contract awards Payment certificates for contracts Quarterly and semiannual progress reports Contracts with consulting services and staff recruitment and payroll records	exceeds contingency and inflation forecasts
Activities with Milestones 1.1 Field surveys for all subprojects completed by June 2007 1.2 Acquisition of right-of-way completed within 6 months of confirmation of right-of-way 1.3 Procurement of consulting services for design, tendering, and implementation of subprojects services by June 2006 1.4 Design and engineering procurement and construction: starts first quarter of 2007 and construction completed by December 2011 1.5 Procurement of consulting services for institutional strengthening: consultants appointed by June 2006, with services completed by the end of 2008 1.6 Human resource development activities to ensure sustainability of all project components: ADB-supported orientation began in March 2005, key training activities to continue through the end of 2006			**Inputs** • Consultancy services for project management, design, implementation of safeguards, and construction oversight • ADB: $300.0 million • Government: $3,060.0 million • Private sector: $750.0 million • Other financial institutions: $1045.0 million

ADB = Asian Development Bank, kV = kilovolt, MVA = megavolt ampere, MW = megawatt.

2. Sector Road Map and Capacity Building

Objectives	Impact	Performance Target	Measurement
Sector Road Map			
1. Reforms			
Transmission Bill 1998 and Policy 2000, Electricity Act 2003, and National Electric Policy 2005	Allows private participation in transmission projects. Unbundling of State Electricity boards and open access Elucidation of "Power for All by 2012" objective Allows power trading between generating units and distribution companies	New transmission projects with competitive bidding or joint ventures from 2006 onwards. Incorporation of separate generation, transmission, and distribution utilities from 2001 through 2004 Universal and affordable electric power service by 2012	Contract awards and utility company reports Utility company articles of incorporation
2. Restructuring			
Regulatory Framework	Creation of state-level independent regulator in 2002	Transition from monopsony to competitive market by 2011	Uttaranchal Energy Department (UED) and utility company reports
Commercialization of operations: • Generation • Transmission • Distribution	Tariffs currently set on cost-recovery principals with 14% return on equity, with lifeline tariffs for poor consumers. Retail tariffs reduced across all consumer categories; tariffs restructured to enhance revenue for distribution operations Over 50 generation projects are under development by independent power producers (IPP) Improving financial management at distribution company operations including improvements in metering, billing, and collection, to reduce non-technical losses. System-wide infrastructure upgrades to reduce technical losses.	Competitive tendering of IPP generation projects in effect from 2004 Full dispatch of available power from all generation units; generating plant load factors maintained at 60% or higher Full compliance with tariff orders issued by Uttaranchal Electricity Regulatory Commission (UERC) Eliminate financial losses at distribution company by 2008 Universal metering at 11 kV distribution feeders achieved in 2005 Maintain and improve financial health of generation and transmission utilities Meet international benchmarks for technical and non-technical losses by 2012	Uttaranchal Electricity Regulatory Commission (UERC) and utility company reports UERC, UED, and utility company reports

Objectives	Impact	Performance Target	Measurement
Capacity Building 1. Adaptive management to sustain reforms and restructuring, covering:			
• Policy – define and implement state-level policy consistent with national objectives and mandates • Planning – develop and update least-cost sector expansion plans	Contribute to economic growth through expansion of power supply at affordable prices. Continue seasonal power trading and expand trading when year-round surplus is created. Plan, design, and implement least-cost generation and transmission system expansion program.	Maintain targeted GDP growth Financially viable and competitive utilities Continued increase of private investment in generating plants, and expansion of private investment in transmission and distribution subsectors Tariffs acceptable to customers and utilities	Government of Uttaranchal reports Annual reports of UERC, Uttaranchal Energy Department, and utility companies Utility company and project monitoring reports
• Investment climate – increase private investment in power sector • Financial management – upgrade and maintain accounting and management systems consistent with international standards and benchmarks	Increase investment and competition in generation, transmission and distribution. Elimination of arrears and aggressive collection of accounts payable Reduction of non-technical losses	Compliance with UERC tariff orders with respect to metering, billing, collection, and other cost control measures	
2. Implementation of ADB-funded investments			
• Project management office and project implementation units • Procurement, contract management, and subproject management • Training and human resource development	First use of international competitive bidding for turnkey contracts in Uttaranchal power sector beginning in 2006–2007 Financial management systems to meet international benchmarks by 2008	In-time and on-budget subproject implementation Restructuring of utilities to asset-management type companies and creation of state-level power trading company by 2011 Open recruitment of professional management and staff initiated in 2004	Utility company and project monitoring reports
• Environmental and social safeguards implementation	Increase of clean energy for electric power	Register and trade carbon credits under Clean Development Mechanism	Incremental revenue from sale of carbon credits

POWER SECTOR ANALYSIS

A. Northern Region Supply and Demand Scenario

1. The persistent power shortage in the northern region can theoretically be made up with imports from the eastern and northeastern regions (Table A2.1). However, several constraints and issues impede such imports, namely: (i) the eastern region surplus depends on coal-fired generation, which is not favored by current national policy; (ii) the projected northeastern region surplus depends on large hydropower plants (HPPs) that have yet to be constructed; (iii) interstate transmission capacity must be expanded to eliminate bottlenecks at the "chicken's neck" in West Bengal; and (iv) overall transmission capacity must be constructed to wheel the expected surpluses between regions.[1] Given these constraints, the projected northern region deficit can readily be met by expanding Uttaranchal's hydropower capacity.

Table A2.1: Load Generation Scenario, Early 11th Plan (2008–2009)
(megawatts)

Region	Installed Capacity	Peak Demand	Peak Availability	Surplus/ (Deficit)
Northern	44,300	41,200	33,200	(8,000)
Western	44,500	41,000	33,000	(8,000)
Southern	37,000	35,000	31,000	(4,000)
Eastern	27,000	13,500	24,000	10,500
Northeastern	6,300	1,500	4,500	3,000
Total	**158,100**	**132,200**	**124,700**	**(7,500)**

Source: Power Grid Corporation of India, Limited.

B. Performance of the Power Sector in Uttaranchal State

2. The Uttaranchal power sector has shown strengths in terms of reducing cross-subsidies across customer categories, implementing merit order dispatch principles, rationalizing tariff slabs, and completing interface metering, weaknesses have overshadowed strengths especially in terms of (i) high aggregate technical and commercial losses (44% in 2003-04); and (ii) no significant capacity additions to date. The government of Uttaranchal is obligated to formulate a financial restructuring plan for securing financial restructuring support that is based on meeting loss reduction targets across the state.

3. Uttaranchal's separation from Uttar Pradesh provided some immediate benefits to the state, for example, segregating the state's grid operations translated into lower overall demand on the Uttaranchal grid, and thus annual aggregate power availability effectively increased (though seasonal shortages still occur). A key positive operational parameter has been the recent performance of Uttaranchal Jal Vidyut Nigam, Limited's HPPs, with a high availability factor and the ability to keep auxiliary consumption within normative levels. The financial risk of the utilities was rated low: Uttaranchal Power Corporation, Limited (UPCL) has been regular in its debt servicing to lenders and earned cash profits in fiscal year (FY) 2001 and FY2002. For FY2003, the coverage of cash costs was high at 85%. However, collection efficiency is an area with scope for improvement.[2]

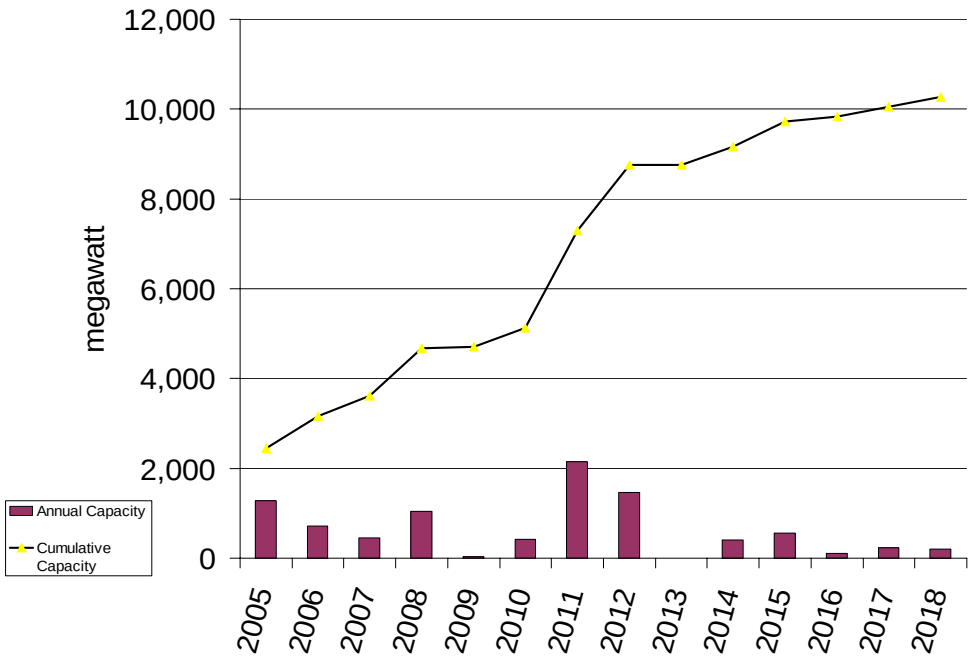
[1] The Asian Development Bank is supporting the expansion of interstate transmission capacity via loans to the Powergrid Corporation of India, Limited.

[2] The Uttaranchal Electricity Regulatory Commission has identified universal metering in the three principal urban load centers as a priority for meeting revenue targets.

C. Generation Potential and Expansion Plans in Uttaranchal

4. Uttaranchal is currently a net importer of electric power, but generates a seasonal surplus and plans to become a net exporter of power by 2010 by expanding its hydropower and high-voltage transmission capacity. Total capacity expansion of 10,000 megawatts (MW) is planned through 2018. Currently 14 projects totaling 5,525 MW are under construction[3] and expected to be commissioned by 2010. An additional 4,791 MW are under development, with expected commissioning dates after 2010, and another 9,090 MW are planned. Figure A2.1 shows the projected annual and cumulative capacity additions from 2005 through 2018.

Figure A2.1: Planned Hydropower Capacity Additions Through 2018



Source: Uttaranchal Jal Vidyut Nigam, Limited

D. Transmission System Expansion

5. The transmission system within Uttaranchal is the responsibility of the Power Transmission Corporation of Uttaranchal, Limited (PTCUL), which provides open access to its facilities on terms that are subject to tariff orders issued by the Uttaranchal Electricity Regulatory Commission. PTCUL was formed by separating UPCL's transmission assets and undertakings and commenced operations on 1 June 2004. The major challenges facing PTCUL are building and operating a network to cope with a fourfold increase in energy transfers within its first 10 years of operation and building the human resource capacity to sustain corporate operations. The proposed investment support from the Asian Development Bank will be critical to this goal.

6. The integrated transmission system for Uttaranchal is intended to provide for the evacuation of new HPP capacity in the state's four major river basins. The load flow studies

[3] This figure includes the Tehri and Koteshwar projects, totaling 2,400 MW, which will transmit power directly to the northern region grid in Uttar Pradesh. These HPPs are not included in the proposed Investment Program.

used to develop PTCUL's transmission system have been prepared by the Central Electricity Authority and assume that the beneficiary of the state's generation will be the northern region. The studies have estimated requirements needed to meet peak conditions in the northern region and therefore allow for the evacuation of electric power from the planned new generation capacities.

E. Distribution Operations

7. UPCL is the sole distribution licensee in Uttaranchal. A key challenge is the high level of aggregate technical and commercial losses, which increased during the first 3 years of its operations. However, the trend has been reversing in FY2005. Commercial losses increased from Rs981.1 million in FY2002 to Rs2,049.5 million in FY2003 with transmission and distribution losses estimated at 35%. Nevertheless, UPCL's overall financial position during the 3-year period ending FY2004 has been reasonably robust because of its high financial margins: UPCL has been able to generate and/or purchase power an average rate of about Re1 per kilowatt-hour while charging consumers at an average rate of Rs2.50 per kilowatt-hour. At the same time, since the creation of the state and the establishment of state-level grid operations, overall end-user tariffs have decreased (Table A2.2), load shedding has decreased, and consumer satisfaction has improved. Pursuant to tariff orders issued by the Uttaranchal Electricity Regulatory Commission, UPCL has initiated systematic efforts to reduce losses, addressing both technical and nontechnical losses.

Table A2.2: Uttaranchal Tariffs by Consumer Category
(Rs/kilowatt-hour)

Category	Before the Creation of the State Electric Regulatory Commission, FY2002	After the Creation of the State Electric Regulatory Commission, FY2005
Domestic	2.05	1.93
Nondomestic (commercial)	4.96	3.21
Private Tube Wells	0.80	1.52
Industry	4.44	3.03

Source: Uttaranchal Electricity Regulatory Commission

F. Sector Sustainability and Road Map

8. Uttaranchal is at a fairly advanced stage of sector reforms and is now in a period of gestation, absorbing the impacts of a newly regulated market. At least two factors bode well for future sustainability: (i) the state has a low proportion of agricultural consumers (which account for less than 10% of overall electricity consumption), and (ii) the government of Uttaranchal has acknowledged that electricity is not a free good. The state-level policies and sector development plans are well defined and the utilities are initiating new management and human resources development strategies. Given the large capital requirements for the sector expansion, external financing is appropriate. The state-level road map for the power sector is presented in Table A2.3. The generation and transmission Investment Program is presented in Table A2.4, with subprojects proposed for ADB support highlighted.

Table A2.3: Power Sector Road Map

Preparatory Phase: 1998–2004	Intermediate Phase: 2004–2012
Legislation and Regulation 1995: Grid code established and notified. The Power Grid Corporation of India, Limited (Powergrid) took over from the Central Electric Authority as the national grid operator.[a] 1998: The National Transmission Bill and the 2000 national transmission policy - allow private participation in transmission via joint ventures or by independent transmission companies. 5 September 2002: The Uttaranchal Electricity Regulatory Commission created as the independent regulator and issues tariff orders as the primary instrument for sector governance. 2003: The 2003 Electricity Act provides for open access and unbundling of state electricity boards into separate generation, transmission, and distribution companies. **Restructuring** 1 April 2001: Incorporation of the erstwhile State Electricity Board as UPCL. As of mid-2004, UPCL was the sole distribution licensee in the state. 9 November 2001: - Incorporation of UJVNL as the state-owned generating utility.	**Anticipated Regulatory Changes** The 2003 Electricity Act may be amended periodically or superceded by new laws. Additional enabling regulations to be drafted and implemented. The Uttaranchal Electricity Regulatory Commission is to appoint two additional commission members in 2006, with fully independent regulation established by 2007. **National Electric Policy 2005** 100% village electrification to be achieved by 2008 and 100% household electrification by 2012. **Regulatory Principles** Tariffs set at the cost of supply with allowed Return on of 14%. Consumers' ability and willingness to pay is expected to be maintained as long as electric service improves and will be enhanced by economic growth. **Restructuring and Operational Implications** PTCUL established on 1 June 2004 as the operator of the state-level high-voltage transmission system (132 kV and higher). The regulatory framework supports the commercialization of utility operations and private sector participation. Open recruitment of professional management for utility companies to be expanded to foster commercial operations.
Generation Operations and Infrastructure UJVNL inherited 1,160 MW of hydropower capacity from Uttar Pradesh. Current generation is within 5% of demand, with seasonal surpluses (and banking and trading). Operators other than UJVNL pay a 12% royalty in the form of free power to Uttaranchal for the use of rivers. UJVNL delivers at least 85% of output to UPCL for in-state consumption, with the excess traded at a premium open market tariff. Power sales outside the state are limited to 15% until a year round surplus has been achieved.	**Capacity Expansion** Key developers are UJVNL, central public sector utilities, and independent power producers. The latter are lead developers for 49 of 99 small hydropower plant projects and several medium plants (larger than 25 MW). Fourteen HPPs totaling 5,525 MW are under construction, with 1,284 MW to be commissioned in 2005 and 723 MW in 2006. In-state demand is expected to be fully met by 2008, with continued seasonal surpluses. The exportable surplus is projected to increase from 2010. **Investment Requirements** Memoranda of understand and financing commitments are in place for new HPPs totaling 2,000 MW to be commissioned by 2011. UJVNL has defined a $150.0

Preparatory Phase: 1998–2004	Intermediate Phase: 2004–2012
	million program for the RMU of existing HPPs with about 1,100 MW nominal capacity that is expected to generate an additional 200 MW of output. New performance contracts are being tested on smaller RMU candidates. Financing commitments to be confirmed for an additional capacity expansion of 2,000 MW with commissioning dates beyond 2011.
Transmission Operations and Infrastructure PTCUL operates the system at 132 kV and higher, wheeling power from HPPs to UPCL's distribution system and to Uttar Pradesh and Powergrid for interstate transfers. The state grid connects to the northern region grid at three key nodal points. The current system consists mainly of 66 kV lines, with limited new 220 kV lines to hydropower plants under construction.	**Capacity Expansion** An integrated generation and transmission expansion plan was approved in 2004 that includes 785 km of 400 kV lines, 180 km of 220 kV lines, 665 km of 132 kV lines, 8 substations, and auxiliary equipment. The 66 kV lines are to be phased out. **Investment Requirements** $450.0 million is required to evacuate power from more than 4,000 MW of new HPP capacity by 2012. An additional $250 million is required through 2018. PTCUL's target is $120.0 million per year for the next 5 years.
Distribution Operations and Infrastructure The separation of Uttaranchal's and Uttar Pradesh's grid operations resulted in reduced load shedding in Uttaranchal and improved consumer satisfaction. Uttaranchal's aggregate technical and commercial losses and technical and distribution losses are above the national average: 46–53% in 2003 and 29–33% in 2004. Initial tariff orders (2003–2005) reduced overall retail tariffs except for a minor increase on private tube wells and improved UPCL's operating margin. Ability and willingness to pay is demonstrated by the current tariff structure and is verified by economic analysis.	**Capacity Expansion** The 33 kV and 11 kV networks are being extended in accordance with rural and village electrification programs. Rural and village electrification programs are being accelerated by means of central Government incentive programs Accelerated Power Development and Reform Program and the Rajiv Gandhi Grameen Vidyutikaran Yojana). **Investment Requirements** Approximately $120.0 million per year from 2005—2010. **Additional Obligations Under Tariff Orders** Routine energy audits, continued incentives for energy efficiency and conservation, documentation of technical and distribution losses, energy accounting, graphical mapping of 11 kV feeders and distribution transformers, 100% consumer metering, meter reading and bill distribution, strengthening of 33 kV and 11 kV feeders, augmentation of 33 kV and 11 kV substations, bifurcation of 11 kV feeders and redistribution of loads, augmentation of distribution transformers and installation of new transformers, and installation of low-tension capacitors at distribution transformers. Aggregate technical and commercial and technical and distribution losses to be reduced by 20% from 2003 to 2008 and to the world average (10–15%) by 2012. Electronic billing and collection system is to be in place with a 60-—to 90-day limit on receivables.

HPP= hydropower plant, kV = kilovolt, MW = megawatt, RMU = rehabilitation, modernization, and upgrade, UJVNL = Uttaranchal Jal Vidyut Nigam Limited, UPCL = Uttaranchal Power Corporation Limited.

[a] ADB approved Loan 1405-IND to the Powergrid Corporation of India, Limited.

Table A2.4 Proposed Uttaranchal Power Sector Investment Program, 2006–2012

Item	Project / Owner / Capacity (MW) or Length (km)	Total Cost ($ million)	2006	2007	2008	2009	2010	2011	2012
Alaknanda Group 1									
New HPPs	Tapovan Vishnugad / NTPC / 520 MW	624		93.6	187.2	249.6	93.6		
	Lata-Tapovan / NTPC / 108 MW	129.6			19.44	38.88	51.84	19.44	
	Bhinderganga / UJVNL / 15 MW	18			2.7	5.4	7.2	2.7	
	Pulana/ UJVNL / 13 MW	15.6				2.34	4.68	6.24	2.34
	Srinagar / Tata / 330 MW	396		59.4	118.8	158.4	59.4		
	Tapovan Vishnugad-Kuwari Pass 10.5 km	40.45		6.07	12.14	16.18	6.07		
	Kuwari Pass-Srinagar-Kashipur 280 km	26.27		3.94	7.88	10.51	3.94		
	Lata-Tapovan-Kuwari Pass 132 kV 21 km	2.91		0.44	0.87	1.16	0.44		
	Bhinderganga-Kuwari Pass 132 kV Kuwari Pass Substation	28.64		4.3	8.59	11.46	4.3		
	Baranvara-Srinagar 132 kV Srinagar-Srinagar Substation 6 km Srinagar Substation	13.49		2.02	4.05	5.4	2.02		
Alaknanda Group 2									
New HPPs	Bawlanandprayag / UJVNL / 132 MW	158.4		18.75	37.5	50	18.75		
	Vishnugad-Pipalkoti / THDC / 420 MW	504				75.60	151.20	201.60	75.60
	Madhyamaheshwar / UJVNL / 10 MW	7.87	1.18	2.36	3.15	1.18			
	Kaliganga I / UJVNL / 4 MW	3.35	0.5	1.01	1.34	0.5			
	Kaliganga II / UJVNL / 6 MW	5.11	0.77	1.54	2.05	0.77			
	Tankul / UJVNL / 7.8 MW	8		1.2	2.4	3.2	1.2		
	Malkhet SHPP Cluster / UJVNL / 68 MW	81.6				12.24	24.48	32.64	12.24
Transmission	Kuwari Pass-Karanprayag 60 km	17.9			2.69	5.37	7.16	2.69	
	Bawlanandprayag-Karanprayag 132 kV 20 km	1.6			0.24	0.48	0.64	0.24	
	Karanprayag Substation	10.7			1.61	3.21	4.28	1.61	
	Malkhet Substation	2			0.3	0.6	0.8	0.3	
	Malkhet-Karanprayag 132 kV	3.6			0.54	1.08	1.44	0.54	
	Karanprayag-Almora 80 km	28.1			4.22	8.43	11.24	4.22	
	Almora Substation	11.2			1.68	3.36	4.48	1.68	
	Almora-Rampur 170 km	21.6			3.24	6.48	8.64	3.24	

Item	Project / Owner / Capacity (MW) or Length (km)	Total Cost ($ million)	2006	2007	2008	2009	2010	2011	2012
Bagirathi Group 1									
New HPPs	Loharinag Pala / NTPC / 600 MW	720		108	216	288	108		
	Pala Maneri / UJVNL / 416 MW	499.2	74.88	149.7	199.6	74.88			
				6	8				
	Maneri I RMU / UJVNL / (144 MW)	15	2.25	4.5	6	2.25			
	Bilangna II / UJVNL 49 MW	58.8		7.5	15	20	7.5		
	Kaldigad / UJVNL / 9 MW	6.5	0.97	1.77	2.6	0.97			
Transmission	Loharinag Pala-Koteshwar / 98 km	29.71	4.46	8.91	11.88	4.46			
Bagirathi Group 2									
New HPPs	Kotlibhel I, II, III / NHPC / 940 MW	1128	56.4	112.8	225.6	225.6	225.6	169.2	112.8
	Mohammadpur RMU / UJVNL / (9.3 MW)	5.49	0.82	1.65	2.2	0.82			
	Pathri RMU / UJVNL / (20.4 MW)	11.78	1.77	3.53	4.71	1.77			
Transmission	Kotlibhel-Roorkee 80 km	26.67				4.00	8.00	10.67	4.00
	Roorkee 400/220 kV 5 km	2.83	0.42	0.85	1.13	0.42			
Yamuna-Tons Group 1									
New HPPs	Arakot Tuni / UJVNL / 70 MW	84				12.60	25.20	33.60	12.60
	Hanol Tuni / UJVNL / 45 MW	54				8.10	16.20	21.60	8.10
	Tuni Palasu / UJVNL / 42 MW	50.4				7.56	15.12	20.16	7.56
Transmission	Hanol Tuni-Khodri 132 kV	12				1.8	3.6	4.8	1.8
Yamuna-Tons Group 2									
New HPPs	Hanuman Chatti / UJVNL / 33 MW	39.6				5.94	11.88	15.84	5.94
	Mori Cluster (7 plants) / UJVNL / 163 MW	195.6				29.34	58.68	78.24	29.34
Transmission	Mori Substation	1.9				0.29	0.57	0.76	0.29
	Mori-Barkot 132 kV	4				0.6	1.2	1.6	0.6
	Barkot Substation	2				0.3	0.6	0.8	0.3
	Barkot-Khodri 132 kV	33.3				5	9.99	13.32	5
Other renovation, monitoring, and upgrade projects	Total program for 9 HPPs /UJVNL/200 MW	150	5	15	35	60	20	10	5
TOTAL		**5,290.77**	**149.42**	**608.9**	**1142.43**	**1,426.53**	**979.94**	**657.73**	**283.51**

km = kilometer, kV = kilovolt, MW = megawatt, RMU = rehabilitation, modernization, and upgrade, SHPP= small hydropower plant , THDC = Tehri Hydropower Development Corporation, UJVNL = Uttaranchal Jal Vidyut Nigam Limited.

Notes: Refer to map 2 for a schematic design. Note that the list includes only "firm" subprojects defined by prefeasibility studies, detailed project reports, and/or a memorandum of understanding with the government of Uttaranchal or UJVNL for project development. Transmission lines are 400 kV except as noted.

Source: Uttaranchal Energy Department

EXTERNAL ASSISTANCE TO THE POWER SECTOR

1. India's power sector has received a major portion of its external assistance from the Asian Development Bank, the Canadian International Development Agency, the Department for International Development of the United Kingdom, the Japan Bank for International Cooperation, Kreditanstalt für Wiederaufbau (KfW) of the Government of Germany, the US Agency for International Development, and the World Bank. Previous Asian Development Bank assistance is listed in Tables A3.1 and A3.2.

Table A3.1: Previous Asian Development Bank Loans to the Power Sector in India

Loan No.	Project	Amount ($ million)	Date Approved
Public Sector			
0798-IND	North Madras Thermal Power	150.0	18 Nov 1986
0907-IND	Unchahar Thermal Power Extension	160.0	29 Sep 1988
0988-IND	Rayalaseema Thermal Power	230.0	21 Nov 1989
1029-IND	Second North Madras Thermal Power	200.0	30 Aug 1990
1161-IND	Power Efficiency (Sector) Project	250.0	26 Mar 1992
1405-IND	Power Transmission (Sector)	275.0	16 Nov 1995
1764-IND	Power Transmission Improvement (Sector)	250.0	6 Oct 2000
1803/1804-IND	Gujarat Power Sector Development Program	350.0	13 Dec 2000
1868/1869-IND	Madhya Pradesh Power Sector Development Program	350.0	6 Dec 2001
1968-IND	State Power Sector Reform	150.0	12 Dec 2002
2036-IND	Assam Power Sector Development Program (Program Loan)	150.0	10 Dec 2003
2037-IND	Assam Power Sector Development Program (Project Loan)	100.0	10 Dec 2003
2152-IND	Power Grid Transmission (Sector) Project	400.0	22 Dec 2004
Subtotal		**3,015.0**	
Private Sector			
7058/1036	Calcutta Electricity Supply Company Transmission	17.8	4 Oct 1990
7082/1142	Calcutta Electricity Supply Company Thermal Power Plant	32.0	13 Dec 1991
7138	Infrastructure Development Finance Company, Ltd.	30.0	14 Oct 1997
7183	Tala–Delhi Transmission Project	62.0	16 Jan 2003
7192	Dahej Liquefied Natural Gas Terminal Project	75.0	13 Jan 2004
7203/2110	Torrent Combined Cycle Power	54.5	25 Nov 2004
Subtotal		**271.3**	
Complementary Cofinancing to			
C-19-IND	Power Finance Corporation for the Tamil Nadu Electricity Board and the Andhra Pradesh State Electricity Board	110.8	13 Nov 1990
Subtotal		**110.8**	
Total		**3,397.1**	

Source: Asian Development Bank

Table A3.2: Previous Asian Development Bank Technical Assistance to the Power Sector in India

Technical Assistance No.	Project	Amount ($'000)	Date Approved
1119-IND	Power Sector Loan	50	6 Feb 1989
1228-IND	Andhra Pradesh State Electricity Board Operational Improvement Support	1,000	21 Nov 1989
1229-IND	National Program for Environmental Management for Coal-Fired Generation	664	21 Nov 1989
1365-IND	Tamil Nadu Electricity Board Operational Improvement	740	30 Aug 1990
1366-IND	Environmental Monitoring and Pollution Control	490	30 Aug 1990
1701-IND	Training Workshop on Environmental Issues Related to Electric Power Generation	100	25 May 1992
1756-IND	Study of Bulk Power and Transmission Tariffs and Transmission Regulations	600	29 Sep 1992
1953-IND	Renewable Energy Development	354	13 Sep 1993
2116-IND	Power System Planning in Orissa	600	28 Jun 1994
2193(L)-IND	Energy Efficiency Support	3,000	27 Oct 1994
2490-IND	Development of a Framework for Electricity Tariffs in Andra Pradesh	300	20 Dec 1995
2738-IND	Preparation of a Power System Master Plan in Gujarat	600	17 Dec 1996
2739-IND	Development of a Framework for Electricity Tariffs in Gujarat	300	17 Dec 1996
2740-IND	Review of Electricity Legislation and Regulations in Gujarat	235	17 Dec 1996
2741-IND	Financial Management Support to Kheda and Rajkot Distribution Profit Centers of the Gujarat Electricity Board	580	17 Dec 1996
2742-IND	Solicitation of Private Sector Implementation of the Chhara Combined Cycle Project	375	17 Dec 1996
2980-IND	Madhya Pradesh Power Sector Development	1,000	7 Jan 1998
3305-IND	Support to the Power Finance Corporation	1,000	24 Nov 1999
3380-IND	Private Sector Participation in Electricity Transmission	600	28 Dec 1999
3573-IND	Preparation of a Reorganization Plan for the Gujarat Electricity Board	600	13 Dec 2000
3574-IND	Consumer Awareness and Participation in Power Sector Reforms	50	13 Dec 2000
3575-IND	Support to Gujarat Electricity Regulatory Commission	450	13 Dec 2000
3734-IND	Preparation of the Kerala Power Sector Development Program	800	4 Oct 2001
3882-IND	Development of a Transfer Scheme for Madhya Pradesh	400	14 June 2002
3882-IND	Legal Support for the Madhya Pradesh Power Sector	150	14 June 2002
3885-IND	Energy Efficiency Enhancement	600	2 Aug 2002
3953-IND	Assam Power Sector Development Program	800	29 Oct 2002
3973-IND	Strengthening Consumer and Stakeholder Communication for the Madhya Pradesh Power Sector	150	5 Nov 2002
4083-IND	Building the Capacity of the Assam Electricity Regulatory Commission	500	24 Jan 2003
4241-IND	Reorganization of the Assam State Electricity Board	1,000	10 Dec 2003
4242-IND	Institutional Development for Rural Electrification	400	10 Dec 2003
4243-IND	Policy and Legal Support for Power Sector Reforms	100	10 Dec 2003
4380-IND	Uttaranchal Power Sector Project	150	16 Aug 2004
4496-IND	Capacity Building for the CDM in India	700	17 Dec 2004
Total		**19,388**	

Source: Asian Development Bank

OUTLINE TERMS OF REFERENCE FOR CAPACITY BUILDING

1. The government of Uttaranchal (GOU) has taken a strong leadership position on economic development, with power system expansion and tourism development identified as the pillars of economic growth. Subsequent to policy and legislative reforms, the Uttaranchal power sector is rapidly evolving from a system of regulated monopolies toward a competitive market. Achieving the policy and sector objectives by 2012 requires a rapid upgrade in institutional capability to manage change as well as simultaneously manage construction of several large-scale power infrastructure projects. GOU and the state-owned utilities recognize the need to (i) expand its knowledge and human resource base to accelerate power sector development, (ii) continue corporate restructuring of utility companies, (iii) broaden its procurement and contracting modalities, and (iv) effectively manage externally funded investments. The implementing agencies have a substantial endowment of human capital in the form of senior technical staff in the UED (UED) and the implementing agencies, but at the same time, the capacity to implement donor-funded investments is limited. The state has had little financial support from external donors, which has been limited primarily to grant-funded technical assistance. UED had some experience with donor-funded projects prior to Uttaranchal's separation from Uttar Pradesh, but has no experience with implementing Asian Development Bank (ADB) loans. Likewise, two of the implementing agencies (Power Transmission Corporation of Uttaranchal, Limited [PTCUL] and Uttaranchal Jal Vidyut Nigam, Limited [UJVNL]) are relatively new companies and have no experience with implementing ADB or other donor loans. The state has limited recent experience with large infrastructure projects, and therefore limited adoption of state-of-the-art technologies in design and execution. Many senior technical staff are nearing retirement age, giving rise to an urgent need to develop the next generation of managerial and technical staff, especially in the implementing agencies. On balance, capacity building is needed in UED and the implementing agencies to sustain its power sector investment program, as well as to implement the proposed ADB-supported investments.

2. PTCUL and UJVNL are at an early stage of familiarization with ADB's policies and procedures. Therefore relevant staff need to be designated for training and additional experienced and qualified staff need to be recruited for implementation. The lack of capacity to absorb and appropriately manage the large amount of funds must also be addressed for both companies. The appropriate mechanism for efficient implementation is a well-functioning Project Management Office (PMO). The structure and functions of the proposed PMO are at an advanced stage of definition and development and encompass the duties, responsibilities, lines of supervision, and limits of authority for all officers, managers, and other staff. Limits on staff rotation will ultimately be established to discourage excessive turnover and a deterioration of the PMO's effectiveness. Complementing the investment subprojects, capacity building will initially cover program implementation support and corporate development.[1] Preliminary indicative budgets are shown in Appendix 5.

A. Implementation Support

3. Implementation support includes (i) the consulting services required for the design and construction of transmission lines, substations, small hydropower plants, and renovation, monitoring, and upgrade; (ii) the preparation of subproject appraisal reports for the candidate (noncore) subprojects; (iii) the implementation of management plans for environmental and social safeguards, including the preparation of environmental and social assessments for

[1] Additional capacity building activities will be defined after completion of a policy analysis study, expected by March 2006.

subprojects introduced after the approval of the multitranche financing facility (MFF); and (iv) the acquisition and installation of project-related information technology. The consultants will also coordinate training programs and provide appropriate on-the-job training. The total estimated time for international consulting services is about 110 person-months over 4 years. The total estimated time for all consulting services is about 220 person-months.

1. Procurement Support

Consultants will do the following:

(i) Help the UED (UED), PTCUL, and UJVNL develop appropriate human resource capacity for near-term (3–5 years) PMO operations.
(ii) Assist PTCUL and UJVNL to prepare and complete technical designs, including bills of quantities, for all subprojects.
(iii) Prepare bidding documents for all subprojects following ADB's procurement procedures and using standard bidding documents and guidelines.
(iv) Evaluate bids and prepare bid evaluation reports, including recommendations for contract awards.
(v) Prepare the necessary documentation for contract signing, mobilization, and withdrawal applications.
(vi) Set up a computerized monitoring program for all components of Projects under the MFF using appropriate off-the-shelf software packages.

2. Environmental and Social Safeguards Implementation

Consultants will do the following:

(i) Ensure that subproject-specific environmental and social mitigation measures are incorporated into contract documents.
(ii) Provide orientation for PMO staff on safeguard measures, including implementation of the Environmental Management Plan (EMP), Resettlement Plan, and indigenous peoples development framework (if necessary).
(iii) Help the PMO identify and recruit external monitoring agencies and provide orientation for the selected external monitoring staff.
(iv) Supervise and evaluate the implementation of environmental mitigation and monitoring measures as specified in the EMP.
(v) Update the EMP as necessary, including carrying out supplemental environmental assessments for additional subprojects appraised after loan approval.
(vi) Monitor and supervise resettlement and other social impact mitigation activities, as defined in the Resettlement Plan, resettlement framework, and indigenous peoples development framework (if necessary).
(vii) Provide training for PMO, PTCUL, and UJVNL staff responsible for designing and implementing safeguard measures for all subprojects.
(viii) Assist UED and the implementing agencies with the preparation of environmental and social assessments for subprojects introduced following the approval of the MFF.

3. Implementation and Management

Consultants will do the following:

(i) Visit subproject sites at regular intervals, monitor progress and advise on main construction activities, provide reports to the PMO and ADB with details of progress, and make recommendations for any corrective actions needed to improve construction progress.
(ii) Review the main equipment manufacturers' drawings and calculations to check arrangements for optimized operation and maintenance and verify compliance with contract specifications.
(iii) Review the procurement and delivery program for each supply contract financed by ADB to ensure compatibility and timely coordination with other contracts and civil works.
(iv) Develop and implement applicable procedures required to ensure adequate control of manufacturing, factory tests, delivery, and acceptance of materials and equipment. Assist with the unpacking and checking of the materials and equipment, follow up on the delivery of delayed components, and make claims.
(v) Assist with the preparation and periodical updating of the overall investment program disbursement schedule, financial statements, and physical accomplishment of targets.
(vi) Help review proposals for power plant commissioning tests and trial operation plans.
(vii) Assist with coordination between various manufacturers and contractors, monitor the progress of each contract, and help prepare progress reports for ADB.
(viii) Help supervise the manufacturing, testing, and commissioning of ADB-financed equipment.
(ix) Assist with preparation and appraisal for additional subprojects introduced following the approval of the MFF.

B. Corporate Development

4. Power sector operations are shifting to fully commercial operations and are expected to shift their mode of operations from traditional state-owned utilities—with an objective of creating employment—to competitive businesses with an objective of optimizing shareholder value.

5. Consulting services shall include the following key activities:

(i) Help PTCUL and UJVNL develop and implement long-term (5–15 years) human resource policies appropriate to their evolving business models and core operations.
(ii) Help PTCUL and UJVNL develop information technology strategy and design, install, and initiate initial operations of the information technology systems necessary to support long-term business operations.
(iii) Help PTCUL and UJVNL adopt computerized accounting and management information systems.
(iv) Help UED design and incorporate an independent, state-level, power trading company.

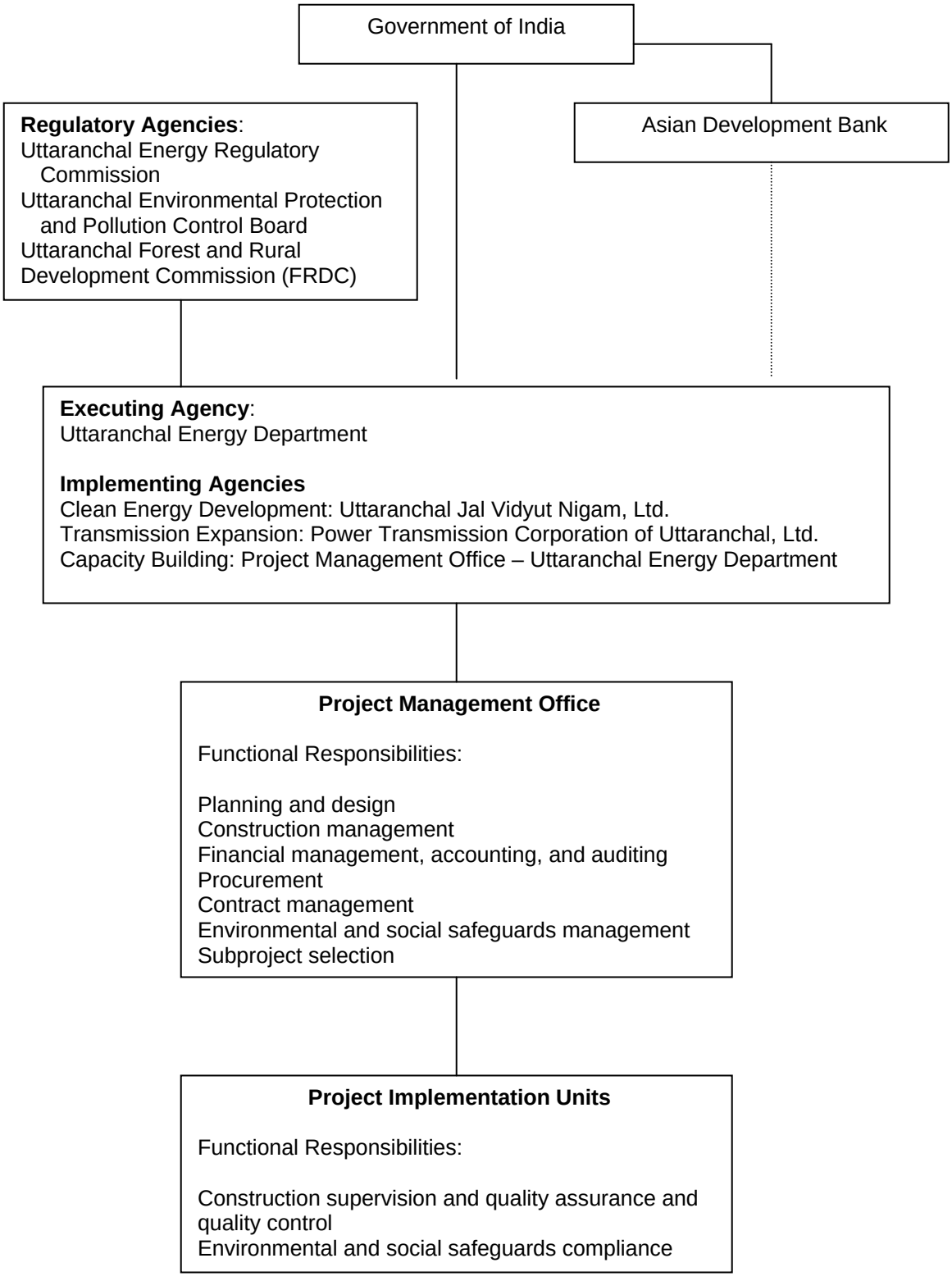
DETAILED COST ESTIMATE BY EXPENDITURE CATEGORY

($ million)

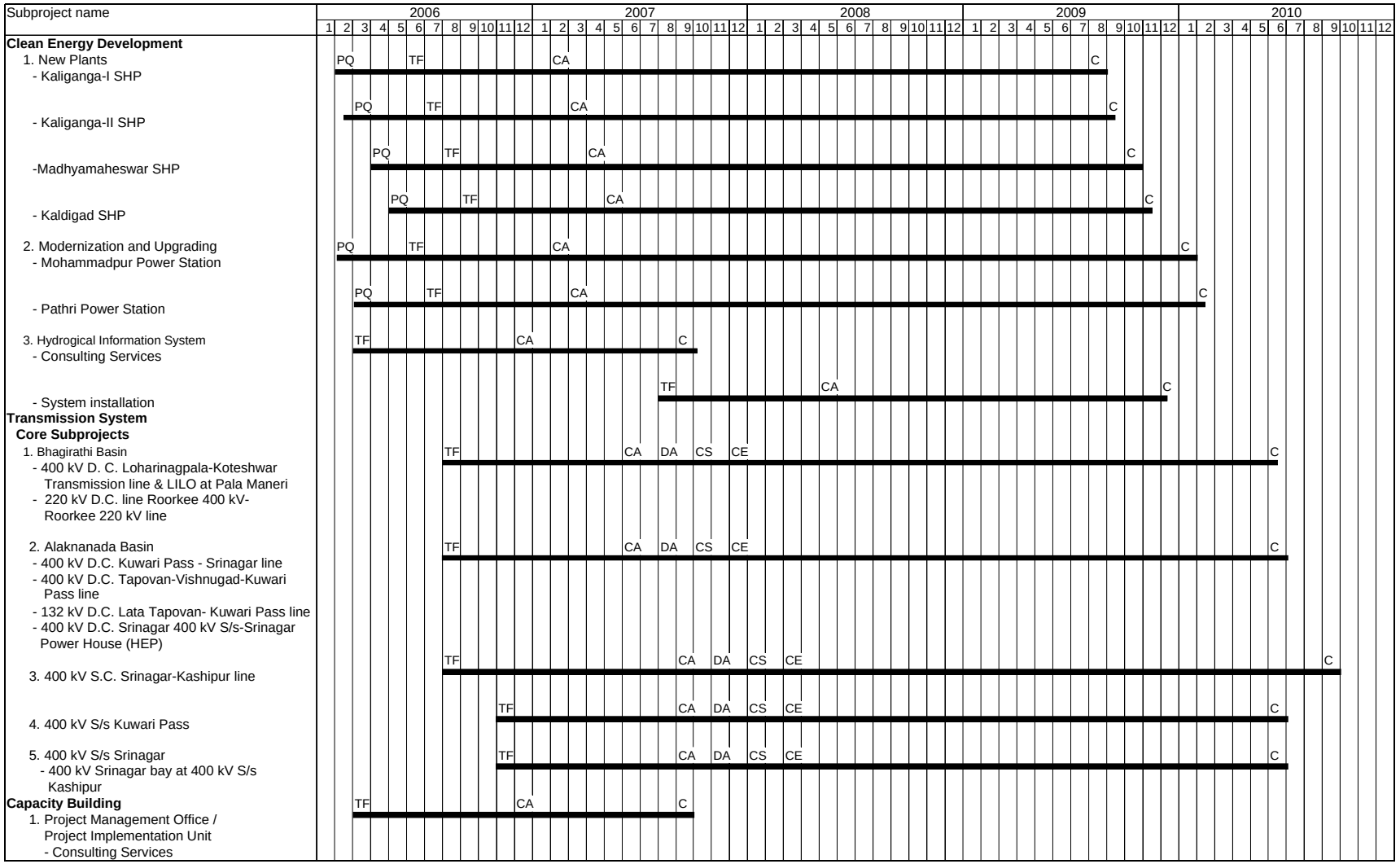
	Total Cost	Base Cost (%)
A. Investment Costs		
Clean Energy Development		
Component A: New Small Hydropower Plants[a]		
1. Kaldigad (9MW, Kaldigad River, Uttarkashi District)	9.62	2.81
2. Kaliganga-I (4MW, Kaliganga River, Rudraprayag District)	4.40	1.28
3. Kaliganga-II (6MW, Kaliganga River, Rudraprayag District)	6.83	1.99
4. Madhyamaheswar (10MW, Kaliganga River, Rudraprayag District)	13.00	3.79
	35.00	**10.20**
Component B: Renovation, Modernization, and Upgrade		
1. Pathri (20.4MW, commissioned in 1955)	12.90	3.76
2. Mohammadpur (9.3MW, commissioned in 1951)	6.10	1.78
	19.00	**5.54**
Component C: Hydrological Improvement		
1. Hydrological Information Systems	6.90	2.01
2. Consulting Services	0.90	0.26
	7.80	**2.27**
Component D: Environment Management Plan	**0.20**	**0.06**
Subtotal	**62.00**	**18.07**
Taxes and Duties	7.00	2.04
Base Costs excluding Taxes and Duties	55.00	16.03
Transmission Expansion		
Component A: Transmission Lines[b]		
1. 400kV Lohari Nagpala – Koteshwar	37.15	10.83
2. LILO of 400kV Lohari Nagpala – Koteshwar at Pala Maneri	3.60	1.05
3. 400kV Srinagar PH – Srinagar s/s	2.60	0.76
4. 400kV Lata Tapovan – Kuwaripass	4.30	1.25
5. 400kV Srinagar – Kuwaripass	41.40	12.07
6. 400kV Srinagar – Kashipur	38.00	11.08
7. 220kV Roorkee – Roorkee	3.16	0.92
8. 132kV Lata Tapovan – Kuwaripass	3.69	1.08
	133.90	**39.04**
Component B: Substations[c]		
1. Kuwari Pass 400/132 kV S/S	33.50	9.77
2. Srinagar 400/132kV S/S	15.50	4.52
3. Kashipur 400kV S/S	1.10	0.32
	50.10	**14.61**
Component C: Environment Management Plan	**3.00**	**0.87**
Candidate Subprojects	**87.00**	**25.36**
Subtotal	**274.00**	**79.88**
Taxes and Duties	26.00	7.58
Base Costs excluding Taxes and Duties	248.00	72.30
Capacity Building		
1. Training/Human Resource Development	1.85	0.54
2. Information Technology (Hardware and software)	0.15	0.04
3. Consulting Services for Design and Planning	2.60	0.76
2. Field Supervision (including safeguards monitoring)	1.10	0.32
3. Corporate Development	1.30	0.38
Subtotal	**7.00**	**2.04**
Total Base Cost	**343.00**	**100.00**
B. Contingencies		
1. Physical[d]	30.00	8.75
2. Price[e]	25.00	7.29
Subtotal (B)	**55.00**	**16.04**
C. Financial Charges During Implementation[f]		
1. Interest During Construction (not financed by ADB loan funds)	39.00	11.37
Subtotal (C)	**39.00**	**11.37**
Total Project Cost Including Candidate Projects	**437.00**	**127.41**

[a] These costs include land acquisition and resettlement compensation costs of $0.19 million in local currency.
[b] These costs include local currency cost of $0.82 million for land and resettlement compensation.
[c] Local currency cost of $3.6 million for land acquisition and resettlement costs is included in the base costs.
[d] Physical contingencies include 10% provision on base costs.
[e] International cost escalation factors and domestic escalation factors for 2005-2009 are used to estimate price contingencies. Foreign inflation of 2% and domestic inflation of 4.8% are applied for years beyond 2009.
[f] ADB loans will finance up to 70% of total project costs, exclusive of interest during construction.

ORGANIZATION CHART FOR IMPLEMENTATION



IMPLEMENTATION SCHEDULE



C = commissioning; CA = contract award; CE = commencement of erection; CS = commencement of supply; DA = drawing approval; kV = kilovolt; LILO = Line in/line out; PQ = Invitation for Prequalification; P/S = power station; SHP = small hydropower plant; S/S = substation; TF = tender float

INDICATIVE PROCUREMENT PACKAGES

Table A8.1: Clean Energy Development

Package No.	Contract Type	Procurement Mode	Estimated Value ($ million)
A. New Small Hydropower Plants			
1. Madhyamaheshwar Hydropower Plant			
Power plant equipment and associated civil works, 33 kV transmission system	Turnkey	International competitive bidding	7.87
2. Kaliganga-I Small Hydropower Plant			
Power plant equipment and associated civil works, 33 kV transmission system	Turnkey	International competitive bidding	3.35
3. Kaliganga-II Small Hydropower Plant			
Diversion weir, power channel, tunnel, power house building, etc.	Civil works	Local competitive bidding	3.39
Power plant and 33 kV transmission system	S + E + C	International competitive bidding	1.72
4. Kaldigad Small Hydropower Plant			
Diversion weir, power channel, tunnel, power house building, etc.	Civil works	Local competitive bidding	4.01
Power plant and 33 kV transmission system	S + E + C	International competitive bidding	2.49
B. Modernization and Upgrading			
1. Modernization and Upgrading of Pathri Power Station			
Power plant equipment and associated civil works	Turnkey	International competitive bidding	11.78
2. Modernization and Upgrading of Mohammadpur Power Station			
Power plant equipment and associated civil works	Turnkey	International competitive bidding	5.49
C. Hydrological Information System			
Consulting services		Quality- and cost-based selection	0.98
Hardware and software	Turnkey	International competitive bidding	7.16

kV = kilovolt; S+E+C = Supply, Erection, and Commissioning.
Note: $1 = Rs43.
Source: Uttaranchal Jal Vidyut Nigam Limited

Table A8.2: Transmission System

Item	Contract Type	Procurement Mode	Estimated Value ($ million)
Bhagirathi Basin			
A. Transmission Line Packages			
400 kV D/C Loharinagpala – Koteshwar and line-in/line-out at Pala Maneri	Turnkey	International competitive bidding	32.54
220 kV D/C Roorkee 400 kV – Roorkee 220 kV			
Alaknanda Basin			
A. Transmission Line Packages			
400 kV D/C Tapovan Vishnugad – Kuwaripass	Turnkey	International competitive bidding	45.61
400 kV D/C Kuwaripass – Srinagar			
400 kV D/C Srinagar P/S Srinagar substation			
132 kV D/C Lata Tapovan – Kuwaripass			
400kV S/C Srinagar – Kashipur	Turnkey	International competitive bidding	24.00
B. Substation Packages			
New 400/132 kV substation at Kuwaripass (including supply of transformers and associated equipment)	Turnkey	International competitive bidding	28.64
New 400/132 kV substation at Srinagar (including supply of transformers and associated equipment) and 400 kV bay extension of Kashipur substation	Turnkey	International competitive bidding	13.49

D/C = double circuit, P/S = power station, S/C single circuit.
Source: Power Transmission Corporation of Uttaranchal Limited

FINANCIAL PERFORMANCE AND PROJECTIONS

A. Financial Management Issues

1. The financial management of Uttaranchal Jal Vidyut Nigam, Limited (UJVNL) and the Power Transmission Corporation of Uttaranchal, Limited (PTCUL) was reviewed and found to be adequate. Progress on strengthening corporate governance and financial management is under way: an independent audit committee, external directors, and open recruitment of managers and other staff and other human resources policies are being actively undertaken. As the newer organization, PTCUL is still in the early stages of establishing its human resource processes and management systems. Both companies are excessively reliant on deputed[1] staff and need to strengthen their human resource programs and finalize their long-term staffing plans. Another issue common to both entities is the need to identify and value the assets that were allocated to the companies during the unbundling process. PTCUL in particular was allocated a large inventory of spare parts and materials and accounts receivable of indeterminate value. The companies' sponsors need to accept some write-off of obsolete stock and uncollectible receivables so that financial reports can be finalized.

2. The 1956 Companies Act, the Income Tax Act, and the 2003 Electricity Act govern accounting and reporting requirements for both companies. Financial reporting is conducted on an accrual basis, with financial statements prepared in accordance with accounting standards issued each year by the Institute of Chartered Accountant of India. Proper accounting policies and procedures are in place for UJVNL and PTCUL, but reporting is slow and needs to be improved, for example, UJVNL's latest audited financial statements are for FY2002. Both companies have failed to meet deadlines for regulatory submissions. The adoption of computerized accounting and management information systems under the MFF would help overcome the current slow and inefficient flow of information.

3. Internal auditors for both UJVNL and PTCUL report to their respective directors of finance, which reduces the internal auditors' independence and threatens the integrity and creditability of their functions. A more independent and autonomous internal audit department is recommended, with auditors reporting directly to their respective boards of directors rather than to the managers of the firms' finances.

4. UJVNL is able to obtain some funding from various state and central government schemes, for example, financing under the Accelerated Generation and Supply Program and equity infusions from the state government. Given its large capital expenditure plan and the current interest in hydropower, UJVNL could conceivably tap private sources of funds to help finance its investment program. However, vigilance is required to ensure that the company's capital investments are technically sound and commercially viable. In some cases, technical and financial evaluations are outsourced to external agencies to ensure high standards of investment evaluation. To strengthen its future corporate strategy and vision, UJVNL is in the process of finalizing the selection of external consultants to help develop a comprehensive business plan and sound financial risk management policies and practices.

[1] Deputed staff are those employees "on loan" from other organizations, but whose salaries are paid by the "borrowing" company.

B. Uttaranchal Jal Vidyut Nigam Limited

1. Financial Performance

5. UJVNL was formed in 2001, shortly after the creation of the state of Uttaranchal. UJVNL was created by separating the assets of Uttar Pradesh Jal Vidyut Nigam, Limited based on location. As a result, UJVNL received 9 large and medium hydropower plants, 9 small hydropower plants, and 23 microhydro stations with total capacity of 1,130.00 megawatts (MW), of which 1,005MW are operated by UJVNL, 5MW by an independent power producer, and the balance of 120MW by the National Hydroelectric Power Corporation, Limited.

6. UJVNL is in the process of initiating a range of new projects that complement the investments of the central public sector utilities by increasing its supply capacity from 1,130 MW to more than 3,000 MW. The new projects will enable UJVNL to meet local demand in the near term and are expected to allow it to sell power outside the state and thereby improve returns, particularly through the sale of peaking power capacity.[2] The largest of the major projects (Pala Maneri) is now in the early stages of implementation and will provide 480 MW from 2011. Maneri Bhali-II (304 MW), which is due to be completed in 2006, will generate significant additional income for the company. The other large hydroelectric power plants in the program are scheduled to start construction over the next 2 to 3 years.

7. Large capital investments will catalyze and sustain long-term economic growth in the state. The financial analysis indicates that the overall program is financially viable provided that UJVNL secures sufficient long-term funds to carry out the slated capital expansion program over a short time span. However, UJVNL will need to carefully manage its expenditures and finances to avoid commitments that unduly stretch its debt-service capacity and/or test the regulator's willingness to raise generation tariffs to a level that covers capital costs. The analysis assumes that the Uttaranchal Electricity Regulatory Commission (UERC) will increase tariffs to cost-covering levels in accordance with UERC and Central Electricity Regulatory Commission guidelines; that the overall investment program will be staggered; and that UJVNL will maintain a minimum capability for projected debt service, that is, a debt-service coverage ratio of 1.2. Figures for FY2001–FY2004 are based on actual figures provided by UJVNL, whereas the projections for FY2005–FY2012 are based on assumptions described in the next subsection. UJVNL's financial projections and past financial data are shown in Table A9.1.

2. Assumptions

8. Domestic inflation is projected using domestic cost escalation factors for 2005–2009[3] published by the Asian Development Bank and at 4.8% per year from 2010 onward. International inflation forecasts use the international cost escalation factors 2005–2009[4] published by the World Bank, and thereafter are assumed to increase at 2% per year.

9. The growth of electricity sales is positively correlated with the availability of an integrated transmission network connected to hydropower stations and an electricity deficit from unmet demand. The projected sale of power is derived from energy to be generated from UJVNL's planned capital investments. Additional energy to be generated as a result of the proposed Investment Program consists of the outputs of four small hydropower plants (SHPPs) and the

[2] The Ministry of Power allows 15% of generation capacity to be sold outside long-term power purchase agreements.
[3] India's Consumer Price Index is estimated at 4.2% for 2005, 3.0% for 2006, 3.5% for 2007, 4.7% for 2008, and 6.4% for 2009.
[4] The Manufacturer's Unit Value index is 3.0% for 2005, 2.8% for 2006, 1.9% for 2007, 1.9% for 2008, and 1.9% for 2009.

output following the renovation, monitoring, and upgrade of two existing SHPPs (Table A9.1). Generation tariff calculations were based on current UERC norms. The generation tariff for the projected years for new projects were adjusted to cover capital costs (depreciation, interest, and return on equity), with an allowable return on equity of 14% according to UERC regulations. UJVNL has three different tariff schemes for existing plants, new large hydropower plants, and new SHPPs. Existing large and small hydropower plants have a flat tariff scheme of Rs0.37 per kilowatt-hour (kWh) and Rs1.7 per kWh, respectively, as stipulated in UERC's FY2004 tariff order, which UJVNL is currently challenging which will be resolved by a high court decision. For the purpose of assessing UJVNL's financial viability, weighted average generation tariffs were calculated based on UERC regulations and were assumed to increase at a measurable rate. Interstate surplus energy is expected to generate export income starting in FY2010 following the commissioning of high-voltage transmission lines.

10. Operating expenses consist of repairs and maintenance, fuel costs, salaries and wages, administrative costs, and depreciation. Starting from current levels of around 4% of gross fixed assets, costs for the repairs and maintenance of generation assets were assumed to decline over time as new plants come into operation. Depreciation was calculated on a straight-line basis at 2%[5] in line with the Companies Act. Supplementary Appendix B provides more detailed assumptions and projections.

C. Power Transmission Corporation of Uttaranchal, Limited

1. Financial Performance

11. PTCUL is a company owned by the government of Uttaranchal that was formed to take over and operate the state's transmission and dispatch system. The company's provisional financial statements for FY2004 which cover its first 9 months of operation, are currently being finalized and audited. The main outstanding tasks are to complete the segregation of accounts and finalize the value of inventory and receivables. The company is conservatively set up with an initial debt to equity ratio of 31:69. During the start-up period, PTCUL has been able to achieve a 22% operating margin, generate a profit of Rs51 million, and maintain ample liquidity with a current ratio of 55. As PTCUL owns and operates Uttaranchal's high-voltage transmission network and is also the key provider of wheeling services for the burgeoning hydropower generation industry, its financial risks are relatively low. The major risks are inadequate cost recovery from investment in transmission lines that may not be fully utilized and the potential adverse impact of unfavorable tariff decisions by the regulator.

12. PTCUL's financial projections are presented in Table A9.2. The major assumptions are detailed in the following subsection. The company's profitability is expected to grow in line with improvements in the efficiency and effectiveness of its operational performance and to approach close to the 14% return on equity ceiling allowed for under current regulations over time. The development of wheeling for the interstate transfers that will result from the Investment Program provides an opportunity for the state regulator to allow PTCUL to pass on costs to customers elsewhere in the northern region. Funding for the Investment Program is significant and will enable PTCUL to undertake its planned investment and spread its debt-service obligations over the medium to long term, consistent with the high capital costs and extended economic life of the transmission network. As a result, projected financial performance indicators are favorable and show that PTCUL will have adequate debt-service coverage for the duration of the MFF.

[5] In line with UERC regulations, UJVNL uses accelerated depreciation over the repayment period for a loan and spreads the life of capital assets over the remaining years.

2. Assumptions

13. The projected transmission revenue stream is derived from projected energy to be wheeled by PTCUL. The tariff is a one-part uniform (“postage stamp”) charge based on full recovery of costs incurred in delivering energy to distributors. The “allowable” costs are assumed to include the costs of transmission losses at up to 2.8% of gross energy entering the transmission grid and the full capital costs of the investment program funded by the Asian Development Bank, consisting of returns of capital (depreciation) and on capital (interest and return on equity) (Table A9.2). In line with UERC regulations, tariff realization is on a full cost-recovery basis; however, the latest tariff order by UERC for FY2005–2006 did not allow recovery of the full cost of supply based on the inherited nature of the company’s assets and liabilities. A wheeling charge of Rs0.10 per kWh was incorporated into the analysis, with a tariff level set on an ad hoc basis for the 9 months of operation in FY2004–2005. The latest wheeling charge approved by UERC for FY2005–2006 is Rs0.06 per kWh, which is reflected in the financial projections. The wheeling charges for the projected years were adjusted upward over 5 years to meet the allowable return on equity of 14% according to UERC regulations pertaining to new investments. The projections assume that surplus electricity after meeting in-state demand is exported to the northern and other regions. As such, interstate surplus energy is expected to generate export income starting in FY2010–2011. Prudent levels of operating costs can be passed through at actual costs in the tariff and include allowances for repairs and maintenance, salaries and wages, administrative costs (including the transmission license fee) based on actual costs in FY2004—2005, and taxes and depreciation. Repair and maintenance of transmission assets are estimated at 1.8% of gross fixed assets, while administrative costs and salaries and wages increase in line with domestic inflation.

14. PTCUL is in the process of finalizing the segregation of accounts following the unbundling of transmission from distribution. This process is due to be completed as UERC’s tariff order of 2005–2006 becomes effective. Additional information is provided in Supplementary Appendix B.

Table A9.1: UJVNL Financial Projections

Item	Audited		Provisional	Projected								
	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Income Statement Summary													
Revenue	555	1,995	1,342	1,620	1,898	3,640	4,330	4,858	9,494	15,622	22,683	28,951	30,834
Operating cost	591	1,661	1,154	1,401	1,468	3,010	3,351	3,314	7,041	11,127	16,286	20,828	21,589
Operating income	(36)	334	188	219	430	631	979	1,544	2,453	4,495	6,397	8,124	9,245
Tax [1]	0	85	28	28	28	28	28	28	28	28	28	28	28
Net income after tax	(36)	245	160	191	469	756	1,105	1,518	2,397	4,501	6,484	8,256	9,444
Cash Flow Summary													
Net cash from operating activities		209	269	222	407	556	1,163	1,743	2,474	4,928	8,313	10,992	12,474
Net cash from financing		1,838	2,140	9,040	9,158	9,866	15,365	18,274	22,584	21,503	11,560	3,059	(1,282)
Net cash from investing		(1,377)	(2,188)	(9,209)	(9,962)	(7,144)	(19,794)	(21,845)	(24,213)	(25,196)	(18,413)	(14,023)	(8,975)
Increase in cash and cash equivalents		670	220	52	(396)	3,278	(3,266)	(1,827)	845	1,236	1,461	28	2,217
Balance Sheet Summary													
Fixed assets	5,928	7,668	10,260	19,447	29,441	36,473	56,164	77,695	101,049	124,927	140,552	150,918	156,797
Current assets	2,417	2,934	2,857	2,980	2,658	6,386	3,275	1,572	3,499	5,982	8,779	10,096	12,616
Total Assets	**8,345**	**10,602**	**13,117**	**22,428**	**32,099**	**42,858**	**59,439**	**79,267**	**104,548**	**130,909**	**149,331**	**161,014**	**169,413**
Current liabilities	592	287	82	112	102	180	225	190	412	682	965	1,229	1,351
Other		444	489	537	591	650	715	787	866	952	1,047	1,152	1,267
Long-term debt	708	2,445	4,703	9,234	14,774	24,406	36,794	50,824	66,830	81,710	88,654	90,396	88,114
Equity	7,045	7,426	7,844	12,544	16,631	17,622	21,704	27,466	36,441	47,565	58,665	68,238	78,681
Total liabilities and equity	**8,345**	**10,602**	**13,117**	**22,428**	**32,099**	**42,858**	**59,439**	**79,267**	**104,548**	**130,909**	**149,331**	**161,014**	**169,413**
Key Performance Indicators													
Debt service coverage ratio (times)	2.2	2.0	1.1	2.9	3.4	1.5	2.2	2.3	1.5	1.3	1.3	1.3	1.3
Return on equity (%)	-	3%	2%	2%	3%	4%	6%	6%	8%	11%	12%	13%	13%
Long-Term debt to equity (%)	9:91	25:75	37:63	42:58	47:53	58:42	63:37	65:35	65:35	63:37	60:40	57:43	53:47
Current ratio	8	10	35	27	26	36	15	8	8	9	9	8	9
Accounts receivable (months)	2.6	2.4	1.3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Operating margin (%)	-1%	44%	20%	33%	43%	31%	42%	37%	33%	38%	39%	39%	43%

[1] Uttaranchal Jal Vidyut Nigam Limited (UJVNL) is allowed to take a 10-year tax holiday for new projects, therefore, taxes are assumed to be paid on the existing assets.

Source: UJVNL and Asian Development Bank estimates.

Table A9.2 PTCUL Financial Projections

Item	Provisional		Projected								
	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Income Statement Summary											
Revenue	443	121	811	1,116	1,672	1,591	2,223	2,697	3,601	2,810	3,526
Operating cost	344	302	441	514	578	652	1,242	1,235	1,247	1,277	1,308
Operating income	99	(181)	371	602	1,094	939	981	1,462	2,354	1,533	2,218
Tax	-	0	47	127	310	266	208	303	615	353	611
Net income after tax	51	(181)	88	236	576	494	386	563	1,143	655	1,136
Cash Flow Summary											
Net cash from operating activities	-	359	111	364	706	709	823	1,047	1,573	1,198	1,524
Net cash from financing	-	2,202	2,773	3,920	4,133	793	(527)	(527)	(1,171)	(920)	(914)
Net cash from investing	-	(2,951)	(2,932)	(3,967)	(4,674)	(1,386)	(347)	(131)	(510)	(90)	(859)
Increase in cash and cash equival	-	(390)	(48)	317	165	116	(51)	389	(109)	188	(249)
Balance Sheet Summary											
Fixed assets	2,301	4,978	7,815	11,642	16,144	17,328	17,153	16,778	16,803	16,428	16,853
Current assets	1,047	390	428	778	1,068	1,176	1,233	1,653	1,638	1,717	1,547
Total Assets	**3,348**	**5,368**	**8,242**	**12,420**	**17,212**	**18,503**	**18,385**	**18,431**	**18,441**	**18,145**	**18,400**
Current liabilities	19	18	32	36	62	60	83	92	131	100	134
Long-term debt	1,043	2,854	5,258	8,627	12,221	12,938	12,411	11,884	10,713	9,793	8,879
Equity	2,286	2,495	2,952	3,758	4,930	5,505	5,891	6,454	7,597	8,252	9,388
Total liabilities and equity	**3,348**	**5,368**	**8,242**	**12,420**	**17,212**	**18,503**	**18,385**	**18,431**	**18,441**	**18,145**	**18,400**
Key performance indicators											
Debt service coverage ratio (times	NA	NA	1.6	1.3	1.3	1.3	1.4	1.5	1.3	1.3	1.5
Return on equity (%)	0%	0%	3%	7%	13%	9%	7%	9%	16%	8%	13%
Long-term debt to equity	31:69	53:47	64:36	70:30	71:29	70:30	68:32	65:35	59:41	54:46	49:51
Accounts receivable (months)	1.8	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Current ratio	54.5	21.4	1.4	1.4	1.8	2.0	2.0	1.3	1.6	1.7	1.8
Operating margin	22%	0%	46%	54%	65%	59%	44%	54%	65%	55%	63%

Notes: 1. Power Transmission Corporation of Uttaranchal Limited (PTCUL) was established on June 2004. Therefore, the actual 2004 includes financial results from June 2004 to March 2005.

2. 2005–2006 returns adversely impacted by Uttaranchal Electricity Regulatory Commission (UERC) order to refund Rs190 million earnings from prior period as per tariff order for 2005–2006.

Sources: PTCUL and Asian Development Bank estimates.

FINANCIAL EVALUATION

A. Introduction

1. The financial analysis of the proposed investments has been carried out in accordance with the *Guidelines for the Financial Governance and Management of Investment Project Financed by the Asian Development Bank*.[1] The financial evaluation includes appraised investment subprojects, mainly for clean energy development, by supporting the expansion of hydropower generating capacity through four new small hydropower plants (SHPPs) and the renovation, monitoring, and upgrade of two existing SHPPs, and Part B, transmission system expansion, by assisting with the expansion of high-voltage transmission lines, associated substations, and auxiliary equipment.

B. Methodology and Major Assumptions

2. Capital costs were estimated in Indian rupees using prices prevailing in FY2004–2005, expressed in constant prices over the construction period of 5 years. The analysis was conducted over the period from FY2005–2006 to FY2025–2026. Capital costs were derived from local sources, which include physical contingencies. Price contingencies and interest during construction were excluded in the estimation of capital costs. The investments were evaluated over a 20-year period to match the loan repayment cycle of 20 years. The salvage value of the proposed investments was calculated using a 2% straight-line depreciation method in line with Uttaranchal Electricity Regulatory Commission regulations during 2004.

3. Financial viability was examined by comparing the incremental costs and benefits of with and without investment scenarios. The incremental costs and benefits of each subproject were derived by assessing the financial position of the relevant company, that is, operation and maintenance (O&M) costs and proposed wholesale generation and transmission tariffs. Capital investments and O&M costs were identified as incremental financial costs for the proposed Investment Program. Incremental financial benefits were conservatively limited to additional electricity to be generated and transmitted as a result of the Investment Program. Tariff calculations for generation and transmission were based on Uttaranchal Electricity Regulatory Commission regulations for 2004 on terms and conditions for determining generation and transmission tariffs, which permit the pass-through of full cost recovery of loan capital at a debt to equity ratio of 70:30; depreciation; 14% return on equity; O&M expenses; and interest on working capital for new subprojects. The assumed wholesale generation tariff used in the financial analysis was Rs1.7 per kilowatt-hour (kWh) and the tariff for transmission was Rs0.14 per kWh.[2] It was assumed that RMU investments would apply the same tariff principles as new projects in relation to being allowed to recover costs.

C. Weighted Average Cost of Capital

4. For estimating the weighted average cost of capital (WACC), it is assumed that the financing sources consist of the UED's equity contribution financed through retained earnings,

[1] ADB. 2002. *Guidelines for the Financial Governance and Management of Investment Projects Financed by the Asian Development Bank.* Manila.

[2] The tariff order for 2004–2005 stipulates that SHPPs and microhydro projects would continue to charge the wholesale tariff of Rs1.7Rs per kWh as prevailed in the past for existing plants. However, for new projects, UERC allows both generation and transmission companies to recover annual revenue requirements consisting of (i) interest on loan capital, (ii) depreciation, (iii) return on equity, (iv) O&M expenses, and (v) interest on working capital.

government funding, and a combination of foreign and local currency loans. It is also assumed that the foreign exchange premium exactly offsets the prevailing foreign inflation rate. These loans are expected to bear different nominal interest rates as provided below in Table A10.1. The debt to equity ratio of 70:30 is maintained in calculating the WACC. The breakdown of the government contribution and internally generated funds is assumed to be 70:30. The cost of equity is calculated at 10%, which reflects a 10-year Indian Government bond yield as a benchmark, risk-free interest rate with a risk premium of 2.5%. The other assumptions include a domestic inflation rate of 5.5% and a tax rate of 12%. The WACC for the Investment Program is 4.36% (Table A10.1).

Table A10.1: Weighted Average Cost of Capital

Item	ADB Loan	Government Funding	Internally Generated Fund	Total
Amount ($'000)	300,000	95,900	41,100	437,000
Weighting (%)	69	22	9	100
Nominal cost (%)	5.0	10.0	10.0	
Tax rate (%)	12.0	0.0	0.0	
Tax-adjusted nominal cost (%)	4.4	10.0	10.0	
Inflation rate (%)	0.0	5.5	5.5	
Real cost (%)	4.4	4.3	4.3	
Weighted component of WACC	3.0	0.9	0.4	4.36

ADB = Asian Development Bank, WACC = Weighted Average Cost of Capital.

Notes: 1. The equity composition of Government contribution and internally generated funds from PTCUL and UJVNL is based on 70:30.

2. Ten percent nominal cost for government contribution and internally generated fund consists of a ten-year India Government bond plus spread.

3. Effective tax rate of 15% reflects a ten-year tax holiday for new projects.

Source: Asian Development Bank estimates.

D. Financial Internal Rate of Return

5. The financial internal rate of return (FIRR) is calculated at 4.8% for clean energy subprojects (Table A10.2) and 7.4% for transmission subprojects (Table A10.3). This rate compares favorably with the estimated value of the WACC of 4.36%, substantiating the financial viability of both core subprojects. Although not included in the FIRR calculation, the Investment Program is expected to generate additional benefits from optimizing operational efficiency and fuel savings. The FIRR for clean energy investments is conservative, because the proposed tariff of Rs1.70/kwh is a "floor": when in-state demand is met, the power output can be traded in the Northern Region grid at a premium tariff, typically Rs2.5/kwh or higher. As a year-round daily power surplus is expected by the year 2012, the subprojects should be able to take advantage of the higher open market tariff for most of the operating lifetime. Additional income from selling Clean Development Mechanism credits is estimated to increase the FIRR to 5.8%.

Table A10.2: Clean Energy Development
Financial Internal Rate of Return

(Rs million)

Year	Incremental Cost			Incremental Benefit						
	Capital Cost	O&M Cost	Total Cost	Generation (MWh) SHP	Generation (MWh) RMU		Sales SHP	Sales RMU	Total Benefit	Net Benefit
2006–2007	435	0	435	0	0	0	0	0	0	(435)
2007–2008	1,016	0	1,016	0	0	0	0	0	0	(1,016)
2008–2009	1,161	0	1,161	0	0	0	0	0	0	(1,161)
2009–2010	290	23	313	0	39,669	39,669	0	57	67	(246)
2010–2011	0	116	116	125,115	56,500	181,614	213	96	309	193
2011–2012	0	116	116	125,115	56,500	181,614	213	96	309	193
2012–2013	0	116	116	125,115	56,500	181,614	213	96	309	193
2013–2014	0	116	116	125,115	56,500	181,614	213	96	309	193
2014–2015	0	116	116	125,115	56,500	181,614	213	96	309	193
2015–2016	0	116	116	125,115	56,500	181,614	213	96	309	193
2016–2017	0	116	116	125,115	56,500	181,614	213	96	309	193
2017–2018	0	116	116	125,115	56,500	181,614	213	96	309	193
2018–2019	0	116	116	125,115	56,500	181,614	213	96	309	193
2019–2020	0	116	116	125,115	56,500	181,614	213	96	309	193
2020-2021	0	116	116	125,115	56,500	181,614	213	96	309	193
2021–2022	0	116	116	125,115	56,500	181,614	213	96	309	193
2022–2023	0	116	116	125,115	56,500	181,614	213	96	309	193
2023–2024	0	116	116	125,115	56,500	181,614	213	96	309	193
2024–2025	0	116	116	125,115	56,500	181,614	213	96	309	193
2025–2026	(2,032)	116	(1,916)	125,115	56,500	181,614	213	96	309	2,224
Total	**871**	**1,881**	**2,751**						**5,007**	**2,256**
									NPV	**130**
									FIRR	**4.8%**

FIRR = Financial Internal Rate of Return, MWh = megawatt-hour, NPV = net present value, O&M = operation and maintenance, RMU = renovation, modernization, and upgrade, SHP = small hydropower plant

Note: 1. Only appraised subprojects are included in the FIRR calculation.
2. Capital costs include base costs and physical contingencies.
3. Two percent depreciation (straight line) is used in estimating salvage value.
4. Generation for SHP in MWh was derived from using 50% plant load factor, 0.50% auxiliary energy Consumption, 0.50% transformer losses and 0.50% transmission losses.
5. Incremental generation figures for RMU projects is expected incremental generation provided by UJVNL.
6. Levelized wholesale tariff of Rs1.7/kWh in constant terms based on tariff calculation by UERC was used for Calculating sales of SHPs and RMUs.

Source: Asian Development Bank estimates.

Table A10.3
Transmission Expansion
Financial Internal Rate of Return
(Rs million)

Incremental Cost				Incremental Benefit		
Year	**Capital Cost**	**O&M Cost**	**Total Cost**	**Transmission (MWh)**	**Revenue**	**Net Benefit**
2006–2007	22		22	0	0	(220
2007–2008	2,201		2,201	0	0	(2,201)
2008–2009	3,497		3,497	0	0	(3,497)
2009–2010	3,490		3,490	0	0	(3,490)
2010–2011	454	386	840	9,166,990	1,283.38	443
2011–2012	0	386	386	9,166,990	1,283.38	897
2012–2013	0	386	386	9,166,990	1,283.38	897
2013–2014	0	386	386	9,166,990	1,283.38	897
2014–2015	0	386	386	9,166,990	1,283.38	897
2015–2016	0	386	386	9,166,990	1,283.38	897
2016–2017	0	386	386	9,166,990	1,283.38	897
2017–2018	0	386	386	9,166,990	1,283.38	897
2018–2019	0	386	386	9,166,990	1,283.38	897
2019–2020	0	386	386	9,166,990	1,283.38	897
2020–2021	0	386	386	9,166,990	1,283.38	897
2021–2022	0	386	386	9,166,990	1,283.38	897
2022–2023	0	386	386	9,166,990	1,283.38	897
2023–2024	0	386	386	9,166,990	1,283.38	897
2024–2025	0	386	386	9,166,990	1,283.38	897
2025–2026	(6,262)	386	(5,876)	9,166,990	1,283.38	7,159
	3,402	**6,179**	**9,581**		**20,534**	**10,953**
					NPV	**2,824**
					FIRR	**7.42%**

FIRR = Financial Internal Rate of Return; MWh = megawatt-hour, NPV = net present value, O&M = operation and maintenance.
Note: 1. Noncore subprojects are excluded in the FIRR calculation.
2. Capital costs include base costs and physical contingencies.
3. Two percent depreciation is used in estimating salvage value of the project.
4. Wheeling charge is estimated at Rs0.14/kWh using UERC transmission tariff determination calculations.
5. Four percent incremental operating costs is applied.
Source: Asian Development Bank estimates.

E. Risk Assessment

6. The three major risks pertaining to the transmission component of the Investment Program are (i) the timing of the commissioning of the associated large hydropower plants[1] with respect to timing of new transmission lines, which are all planned to be commissioned in 2010–11; (ii) the identification of buyers through interstate power trading once in-state demand has been met in 2010; and (iii) the regulatory risks related to tariff setting. All the risks have a noticeable impact on the revenue stream of the Power Transmission Corporation of Uttaranchal, Limited. The risks associated with (ii) and (iii) are also relevant to UJVNL. However, in UJVNL's case, the risks are somewhat higher given that 26 large, medium, and small hydropower are to be commissioned within 10 years, including four SHPPs funded by the Asian Development Bank. The total capacity is expected to be 2,597 MW, with an investment amount of approximately Rs136 billion ($3 billion) in UJVNL's pipeline. The uncertainty inherent in identifying adequate financing sources in a timely manner raises concerns about financial

[1] Lohari Nag Pala (520 megawatts [MW]), Tapovan Vishnugad (360MW), and Lata Tapovan (108MW) – by the National Thermal Power Corporation and of Pala Maneri (416MW) by Uttaranchal Jal Vidyut Nigam, Limited.

sustainability at an institutional level. UJVNL may need to justify its proposed capital investment program and adjust the time of the commissioning schedule to reflect a realistic timetable.

7. A separate analysis was carried out for the appraised subprojects to examine the sensitivity of the FIRR and financial net present value to adverse changes in key variables. The variables considered for the sensitivity analyses were a 1-year implementation delay, a 20% increase in capital costs, a 20% increase in O&M costs, and a 20% decrease in SHPP and RMU tariffs (Table A10.4), and a 1-year implementation delay, a 20% increase in capital costs, a 20% increase in O&M costs, a 20% decrease in wheeling charges, and a 10% decrease in energy sales for transmission components (Table A10.5). The sensitivity analyses for the two subprojects indicate that both are resilient to an increase in O&M costs and relatively sensitive to increases in capital costs, tariffs, sales, and energy generation.

Table A10.4
Clean Energy Development
Financial Results of Sensitivity Analyses

Item	FIRR (%)	FNPV	Switching Value (%)
Base case	4.8	130	
1 year implementation delay	4.6	82	
20% increase in capital cost	3.9	(158)	5
20% increase in O&M cost	4.4	15	11
20% decrease in on tariff	3.8	(171)	(4)
With CDM revenue	5.8	423	

CDM = Clean Development Mechanism, FIRR = Financial Internal Rate of Return, FNPV = financial net present value, O&M = operation and maintenance
Source: Asian Development Bank estimates.

Table A10.5
Transmission Expansion
Financial Results of Sensitivity Analyses

Item	FIRR (%)	FNPV	Switching Value (%)
Base case	7.4	2,824	
1 year implementation delay	6.6	1,989	
20% increase in capital cost	5.2	933	30
20% increase in O&M cost	6.6	2,085	76
20% decrease in wheeling charges	4.8	368	(23)
10% decrease in energy sales	6.1	1,596	(23)

FIRR = Financial Internal Rate of Return, FNPV = financial net present value, O&M = operation and maintenance
Source: Asian Development Bank estimates.

ECONOMIC ANALYSIS

A. Introduction

1. The proposed investments to be funded by ADB are part of an integrated generation and transmission expansion program within Uttaranchal, and an integral component of the National Electricity Plan prepared by the Central Electricity Authority using least-cost planning principles. The economic analysis confirms that the Investment Program will ease chronic supply shortages in the northern region and help meet projected growth in demand for electric power. Demand forecasts and cost-benefit projections were prepared and analyzed, which indicate that the Investment Program is economically viable.

B. Demand Forecasts

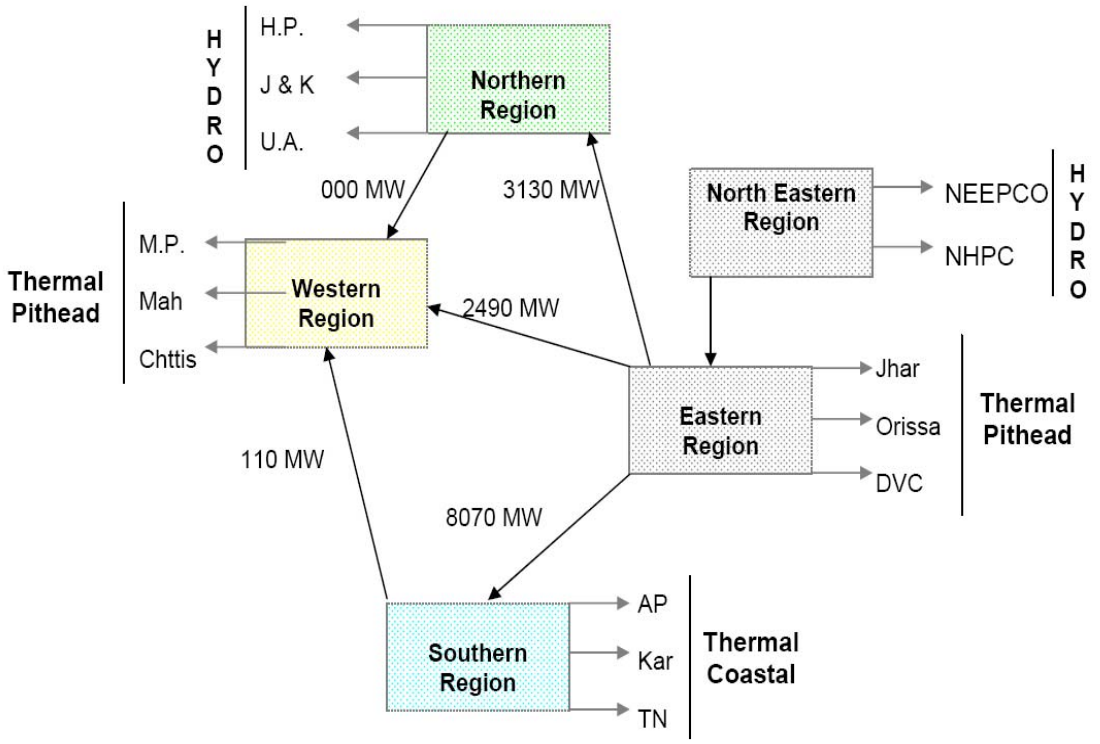
2. The Central Electricity Authority prepares national electricity demand forecasts. The latest available national forecast, the 16th electricity power survey, was carried out in 1999 and covered energy demand and peak load requirements up to 2016–2017, using both short-term (2006–2007) and long-term (2016–2017) forecasting methods. The survey was based on historical data from 1992/93 to 1997/98. The short-term forecast ranged from 1998/99 to 2006/07, and was extended to 2011/12 for the long–term forecast. However, actual electricity consumption for the past 6 years demonstrates the following:

(i) Overall electricity consumption overall was far below forecast levels.
(ii) Growth in demand for 1998–1999 to 2001–2002 was extremely low, recovering somewhat in the next 2 years.
(iii) Consumption in almost every sector, including the domestic, agriculture, industrial, and commercial sectors, was below projections.

3. The National Electricity Plan and the survey load forecasts indicate that in 2006-2007, the northern region's aggregate demand for and supply of energy will be in balance, but that a 6.3% capacity deficit will occur seasonally. Furthermore, by the time the transmission subprojects have been completed (2011–2012), there will be a slight capacity surplus (0.8%). These projections were reviewed in light of the unexpectedly low growth in demand during 2000 to 2005. Time series and regression analyses were used to analyze the results of the survey based on gross domestic product (GDP) and electricity consumption from 1980–1981 to 2003–2004. A forecast up to 2011–2012 was then prepared using the Asian Development Bank's (ADB's) forecast of real GDP growth. The revised forecasts based on projected GDP indicate that the demand forecasts underlying the National Electricity Plan are sound and that the proposed investments are justified on demand and supply considerations.

4. The base case, "with project," demand and supply balance is illustrated in Figure A11.1. In the with project scenario, the northern region develops its hydropower resources. Thermal pithead power supply capacity of 3,130 megawatts from the eastern region helps meet demand.

Figure A11.1: Inter-Regional Power Flows (MW): 2011-12 "With Project"

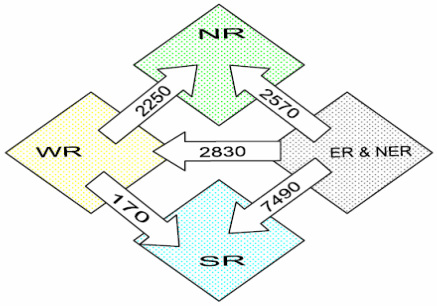


AP = Andra Pradesh, Chttis = Chattisgarh, H.P = Himachal Pradesh, J & K = Jammu and Kashmir, MAH = Maharashtra, MP = Madhya Pradesh, MW = megawatt, NHPC = National Hydropower Development Corporation, NEEPCO = Northeast Power Company, TN = Tamil Nadu, U.A. = Uttaranchal

Source: Draft National Electricity Plan 2005 Figure 9.2

5. In the "without project" scenario, intensive hydropower development would not occur. In this case, the grid extension would not be required, because the purpose of the proposed investment is to provide transmission from the new hydropower generating plants to the existing grid. In the event of low hydropower development, the shortfall would be made up by increased capacity from thermal power plants located in the Eastern and Western regions, supplemented by peaking capacity from gas turbines located at the load centers. The flows are indicated in Figure A11.2

Figure A11.2: Low Hydro Development (Without Project Scenario)



ER = Eastern Region, NER = Northeast Region, NR = Northern Region, SR = Southern Region, WR = Western Region.

Source: Draft Electricity Plan 2005 Figure 9.7.

C. Economic Analysis Calculations

1. Least-Cost Study

6. The approach taken to establish the least-cost nature of the proposed Investment Program is based on information extracted from the draft National Electricity Plan presented by the Central Electricity Authority in March 2005. The planning approach and methodologies are as described in the draft plan. The material from the Central Electric Authority covers the overall system planning approach for India and is supplemented by conclusions from ADB's independent cost-benefit analysis.

2. Least-Cost Review

7. **Generation Options.** The cost-benefit analysis includes a comparison of the delivered costs of hydropower from Uttaranchal to the northern region's load centers with the delivered cost of thermal power supply from a mix of coal-fired power stations (base load) and gas-fired peaking plants. The cost-benefit analysis indicates that hydropower is cheaper than the alternative thermal power option.

8. **Transmission Options**. Although in theory the various hydropower developers could build their own dedicated power evacuation facilities, few, if any, options for developing different lines and routes are available because of topographical and environmental constraints. The integrated Transmission Network Plan is therefore the only realistic routing option.

3. Cost-Benefit Analysis

9. **Resource Cost Saving.** Comparison of the with and without project scenarios indicates that the delivery of hydropower will partly displace more expensive thermal power and will partly serve induced demand for incremental electricity. The resource cost savings are estimated as the difference in cost between hydropower electricity, priced at $0.053 per kilowatt-hour and thermal power electricity priced at $0.064 per kilowatt-hour for bulk deliveries at the load centers of the northern region.

10. **Willingness to Pay.** The willingness of domestic consumers within the northern region to pay for additional energy (incremental consumption) was calculated by developing a consumer demand function. The form of the demand function follows ADB's *ERD Technical Note No. 3.*[1] For other categories of consumption, the average tariff for each category of consumer was taken as a proxy of consumers' willingness to pay. This approach is considered conservative given that tariffs, particularly for agriculture, are subsidized and priced well below alternative forms of energy supply.

D. Results

11. Excluding a consideration of environmental benefits, the projected economic internal rate of return (EIRR) is 21%, which is above the economic cost of capital criterion of 12%. A present value of $136.0 million for the net benefit of the Investment Program was identified as well. The economic viability was justified accordingly. When environmental benefits (global greenhouse gas reductions) are taken into account, the EIRR is 28%, with a present value of $283.0 million.

[1] Asian Development Bank. 2002. *Economics and Research Department Technical Note No. 3.* Manila.

12. A series of sensitivity studies was carried out by taking into consideration various key factors that could have significant adverse impacts on the Investment Program. The studies included a capital cost overrun of 10%, a reduction in energy sales of 5%, a 1-year delay in benefits, and all impacts together. The results showed that the EIRRs for these negative changes were in the range of 10 to 19%, excluding the environmental benefits. The only factor that brought the EIRR below the 12% criterion was a reduction in energy sales, which appears to be the least likely possibility given the unmet demand that exists in the Northern Region and most of India. When the environmental benefits were included, the EIRR was at least 21%. Thus the economic viability of the Investment Program is considered robust.

Table A11: Calculation on Economic Internal Rate of Return for Uttaranchal Power Sector Investment Program

Item		2007	2008	2009	2010	2011	2012	2013	2014	2035	NPV
Electricity Generated by Hydropower											
Energy Generated	GWh	0.0	0.0	0.0	0.0	9,206.8	9,206.8	9,206.8	9,206.8	9,206.8	45,891
Cost at Busbars	Mli. $	0.0	0.0	0.0	0.0	396.7	396.7	396.7	396.7	396.7	1,977.4
Energy Delivered	GWh	0.0	0.0	0.0	0.0	8,698.4	8,698.4	8,698.4	8,698.4	8,698.4	43,357
Project: Transmission in Uttaranchal											
Capital Cost	Mli. $	33.7	71.4	80.5	18.3	0.0	0.0	0.0	0.0	0.0	156.0
O&M Cost	Mli. $	0.0	0.0	0.0	7.1	7.1	7.1	7.1	7.1	7.1	40.1
Wheeling cost outside Uttaranchal	Mli. $	0.0	0.0	0.0	0.0	24.5	24.5	24.5	24.5	24.5	122.3
Total Supply Cost	Mli. $	33.7	71.4	80.5	25.5	428.4	428.4	428.4	428.4	428.4	2,295.8
Benefits											
Power Supply Benefit	Mli. $	0.0	0.0	0.0	0.0	488.0	488.0	488.0	488.0	488.0	2,432.2
Environmental Benefit	Mli. $	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Benefit	Mli. $	0.0	0.0	0.0	0.0	488.0	488.0	488.0	488.0	488.0	2,432.2
Net Benefit	Mli. $	(33.7)	(71.4)	(80.5)	(25.5)	59.6	59.6	59.6	59.6	59.6	136.4

GWh = gigawatt-hour, O&M = operation and maintenance.
Source:

EIRR	**21%**	
Inputs:		
Discount rate	12%	
Foreign exchange rate	43	Rs/$
Standard Conversion Factor	0.95	
System loss inside Uttaranchal	2.8%	
System loss outside Uttaranchal	2.8%	
Hydropower generation cost	0.043	$/kWh
Wheeling charge out Uttaranchal	0.003	$/kWh
Thermal Delivered Cost	0.0637	$/kWh
Willingness to pay	0.0520	$/kWh
Project output consumed at WTP	65%	
Weighted average benefit	0.056	$/kWh

Sensitivity Analysis of EIRR Excluding C02 Benefit	**Change in Variable**	**EIRR (%)**	**NPV ($ million)**
Base Case		21	136.0
(i) Capital Cost Overrun	10%	19	117.0
(ii) Energy Sales Reduction	5%	13	15.0
(iii) Implementation Delay	1 year	18	99.0
(iv) Combination of (i), (ii), (iii)		10	(29.0)

Sensitivity Analysis of EIRR Excluding C02 Benefit	**Change in Variable**	**EIRR (%)**	**NPV ($ million)**
Base Case		28	283.0
(i) Capital Cost Overrun	10%	24	223.0
(ii) Energy Sales Reduction	5%	22	161.0
(iii) Implementation Delay	1 year	25	210.0
(iv) Combination of (i), (ii), (iii)		18	118.0

EIRR = Economic Internal Rate of Return, GWh = gigawatt-hour, kWh = kilowatt-hour, Mli. = million, NPV = net present value, WTP = willingness to pay
Source: Asian Development Bank estimates.

SUMMARY POVERTY REDUCTION AND SOCIAL STRATEGY

A. Linkages to the Country Poverty Analysis

Sector identified as a National Priority in Country Poverty Analysis? Yes	**Sector identified as a National Priority in country poverty Partnership Agreement? N/A**

Contribution of the sector/subsector to reduce poverty in India:
Major interventions in the energy sector are designed to achieve economic progress through infrastructure development. Both physical investment support and sector reform are necessary so that the benefits from economic growth will accrue to the poor. Improved transmission and cleaner and renewable hydropower will specifically benefit the poor because they are the most adversely affected by pollution and environmental degradation.

The Investment Program will reduce system losses and improve frequency and voltage levels, leading to more efficient energy use and making more power available to support economic growth. By expanding generation capacity and the transmission grid, the Investment Program is expected to result in efficient and more reliable delivery of services to consumers, particularly benefiting commercial, residential, and agricultural customers in the region. The integrated generation and transmission expansion program will fulfill all in-state demand and will eventually provide surplus power for export. This will generate new income for the state government that will be devoted to economic and social development.

Poor and vulnerable consumers, including hospitals, schools, and other social utilities, who are often the hardest hit by inadequate power supply, load shedding, and poor power quality, will benefit directly from the subprojects. Direct positive economic and social benefits will result from the Investment Program. Power generated by small hydropower plants will be connected to the local grid at 33 kilovolts, which will contribute to the Government's goal of providing affordable, universal electric service by 2012. Increasing power supplies to local grids will bring the benefits of electricity to remote communities, including better health care, sanitation, and education; greater income-earning opportunities; and higher living standards. The renovation, modernization, and of existing hydropower plants will provide more reliable power to the existing grid.

A positive, direct impact on local labor is expected during implementation and an indirect impact will be due to the increased income-earning opportunities generated by increased access to electricity.

B. Poverty Analysis **Proposed Classification: General intervention**

Technical assistance consultants have prepared a social impact assessment and a poverty impact assessment. A socioeconomic survey was undertaken to provide a basis for the assessments.

Uttaranchal is one of India's poorest states. The per capita net state domestic product was Rs13,000 in 2002, compared with the national average of Rs18,000. A recent survey noted that 36% of rural families in Uttaranchal are below the poverty line. Poverty is unevenly distributed throughout the state, with pockets of extreme poverty in the interior rural areas. A third of the population in Uttaranchal does not own land and lives in rented accommodations. Sharp differences are apparent between districts. Dehradun and Nainital have higher than average per capita income, while Bageshwar, Chamoli, Pithoragarh, and Uttarkashi have lower than average per capita income and are considered to be extremely poor. The incidence of poverty ranges from 18% of the population living below the poverty line in Haridwar to 69% in Uttarkashi. The average below the poverty line population in rural areas of Garhwal division (seven districts), where most of the transmission subproject investments are located, is 46%, skewed upward by high figures in Uttarkashi, Tehri (57%), and Chamoli (52%). About one third of the population in rural areas in the other hill districts is below the poverty line. According to the government of Uttaranchal, about 416,018 people were identified as living below the poverty line in 2002. Based on a total population of 8,489,349 according to the 2001 census and the percentage of people living below the poverty line noted by the Planning Commission, the total number of people living below the poverty line is estimated at 292,800, which in lower than the figures estimated by the Uttaranchal government (and is higher than in the neighboring state of Himachal Pradesh).

Employment in Uttaranchal is mostly agriculture and forest based. According to statistical data, around 37% of the total population works, of which 27% have regular employment and 10% are part-time workers.

The Investment Program is expected to create new full-time employment opportunities. For civil works on small hydropower plant and renovation, monitoring, and upgrade investments, UJVNL expects to hire 160 and 240 unskilled workers, respectively, for a period of 3 years. For the civil works on transmission lines, about 650 unskilled local workers will be hired for a period of 18 months. Improved power supplies will induce light industrial and commercial activity, creating employment opportunities and improving the productivity and quality of outputs in the manufacturing and agriculture sectors.

C. Participation Process

Is there a stakeholder analysis?	☒ Yes	☐ No
Is there a participation strategy?	☒ Yes	☐ No

Stakeholder analysis has been undertaken. All stakeholders have been actively involved to reduce the likelihood of grievances and to ensure that benefits are distributed fairly. In addition, for the selection of unskilled labor in the project area, the contractors will consult with local township labor officials and local village leaders and will also ensure that labor is hired on a nondiscriminatory basis.

D. Gender and Development

Strategy to maximize impacts on women:

The poor and women have been included in conducting participatory activities.

Has an output been prepared? ☐ Yes ☒ No

E. Social Safeguards and other Social Risks

Item	Significant/ Not significant/ None	Strategy to Address Issues	Plan Required
Resettlement	☒ Significant ☐ Not significant ☐ None	The proposed subprojects involve the construction of high-voltage transmission lines, run-of-river hydropower facilities, and substations. Some land acquisition is required, although impacts on individual households are limited.	☒ Full ☐ Short ☐ None
Indigenous Peoples	☐ Significant ☐ Not significant ☒ None	The subprojects identified so far do not pass through areas of significant settlement or use by indigenous peoples. However, an indigenous peoples development framework was prepared to cover any impact the noncore subprojects may have.	☐ Yes ☒ No
Labor	☒ Significant ☐ Not significant ☐ None	Positive impacts are expected. The subprojects will require construction labor and will result in permanent employment for the operation and maintenance of project facilities. Figures are provided in the main text.	☐ Yes ☒ No Not required
Affordability	☐ Significant ☒ Not significant ☐ None	The subprojects are unlikely to result in increased prices of goods and services accessed by the poor. The investments will support the Government's goal of affordable power for all by 2012, which is considered a pro-poor initiative. Electricity tariffs are regulated by the Government and include lifeline tariffs for poor consumers.	☐ Yes ☒ No Not required
Other Risks and/or Vulnerabilities	☐ Significant ☐ Not significant ☒ None	There are no known fisheries or migratory fish species in the project area, and fish do not constitute a principle source of protein in the diet of the majority of the population. The livelihoods of downstream communities will not be adversely affected. The development of aquaculture may be viable as a means of local income generation. The UED and the implementing agencies have been responsive and pro-active in addressing all social concerns related to the investment program supported by ADB.	☐ Yes ☒ No

SUMMARY RESETTLEMENT FRAMEWORK

A. Core Subproject Description and Area

1. The core subprojects[1] are (i) small hydropower plants, namely, Kaliganga-I (Jaltlala and Khunnu Kotimasheswari villages, Rudraprayag district), Kaliganga-II (Khunnu Kotimasheswari and Kobilta villages, Rudraprayag district); Madhyamaheswar (Girriyagon and Chuni villages, Rudraprayag district), and Kaldigad (Sangam Chatti village, Uttarkashi district); and renovation, modernization, and upgrade; (ii) expansion of the Alakananda basin and Bhagirati basin transmission systems, including Kuwari Pass (Ravigram village, Chamoli district) and Srinagar (Khandukhal village, Pauri district) substations; and (iii) capacity building.

B. Scope of Land Acquisition and Resettlement

2. The land acquisition and resettlement impacts of the core subprojects have been assessed and documented in a Resettlement Plan. Based on the Resettlement Plan, core subprojects for clean energy development will require 24.06 hectares (ha) of permanent land acquisition (both private and public) and 179.21 ha of temporary land acquisition.[2] Transmission expansion will require 13.99 ha of permanent land acquisition and no temporary land acquisition. Capacity building will not involve any land acquisition or resettlement. Land acquisition and resettlement resulting from the core subprojects will affect 25 households on a permanent basis and 229 on a temporary basis. None of the components will cause any loss of structures.

C. Scope of the Resettlement Framework

3. The resettlement framework was prepared for the noncore subprojects as required by ADB's *Involuntary Resettlement Policy*[3] for sector lending. The resettlement framework identifies the broad scope of the Investment Program and outlines the policy, procedures, and institutional requirements for preparing subsequent subprojects under the sector loan. The executing agency will be the UED (UED). The implementing agencies will be the PTCUL and UJVNL. The project management office (PMO), through project implementation units (PIUs), will be responsible for preparing social analysis and resettlement plans for subprojects as outlined in the resettlement framework. The draft resettlement plans will be submitted to the Asian Development Bank (ADB) for review and approval prior to contract award, and compensation will be paid to all affected persons prior to displacement, or in any case, no later than the commencement of civil works.

D. Resettlement Policy and Framework

4. The 1894 Land Acquisition Act (LAA), as amended in 1984, and the *National Policy on Resettlement and Rehabilitation for Project Affected Persons* provides the legal framework for land acquisition for public purposes in India. They enable state governments to acquire private land for public purposes and ensure that no one is deprived of land except as provided for under the act and the policy. The resettlement framework is based on both Government and ADB policy. The resettlement framework and resettlement procedural guidelines will apply to all

[1] During project implementation, additional subprojects will be appraised by the Uttaranchal Energy Department and will be reviewed and approved by the Asian Development Bank in accordance with established project administration procedures.

[2] Of the 179 ha temporarily acquired, lost agricultural income from an estimated 115 ha of agricultural land will be compensated. The average household size in Uttaranchal is 5.29 people and the average land tenure is 0.5 ha. No land acquisition is expected for the renovation, monitoring, and upgrade.

[3] ADB. 1995. *Involuntary Resettlement Policy.* Manila.

subprojects under the sector loan, ensuring that all those affected are awarded appropriate compensation and rehabilitation assistance. In addition, in agreement with UED and the implementing agencies, safeguard best practice in the sector[4] was considered. In particular, Powergrid Corporation of India, Limited environmental and social policy and procedures are used as the best-practice example for the Investment Program. The entitlement matrix in the table shows how gaps in Government and ADB policies will be bridged.

Entitlement Matrix

Losses	Affected Persons	Entitlement	Details
Loss of agricultural land	Owners with titles to land and affected persons with traditional land rights	Provision of equivalent land within the same village If land is unavailable, compensation at market or replacement value Resettlement assistance Assistance to vulnerable affected persons (female-headed households, scheduled tribal households, scheduled caste households, poor households, and households headed by physically handicapped or disabled persons)	Alternative land. Compensation based on the LAA (inclusive of 30% solatium and 12% interest). If the market/replacement value of land as determined by the resettlement committee is more than the above rate, the difference will be provided in the form of a grant by the Project directly to affected persons.[a] Affected persons will be refunded transaction costs (document stamps, registration costs, etc.) if replacement land is purchased within 1 year of compensation. Resettlement assistance equivalent to 365 days of agricultural wage per household. Vulnerable households will be provided with all the above assistance and will be prioritized in land-for-land alternative. If land-for-land is unavailable, an additional relocation allowance of 500 days of agricultural wage per household will be provided.
	Individual tenant, sharecropper, or leaseholder	Reimbursement for unexpired lease	Lease rates will be determined by the resettlement committee based on consultation with landowners.
Temporary loss of agricultural land	Farming households, sharecroppers, tenants, households without titles to the land	Notice to harvest standing crops Compensation at market value Restoration	Compensation at market value for the equivalent of 9 months of crop income.
Loss of homestead and commercial land	Owners with titles and affected persons with traditional land rights	Provision of equivalent land within the same village If land is unavailable, compensation at market or replacement value Assistance to vulnerable affected persons	Alternative land. Compensation based on the LAA (inclusive of 30% solatium and 12% interest). If the market or replacement value of land as determined by the resettlement committee is more than the above rate, the difference will be provided in the form of a grant by the Project directly to affected persons. Affected persons will be refunded transaction costs (document stamps, registration costs, etc.) if replacement land is purchased within 1 year of compensation. Vulnerable households will be provided with all the above assistance and will be given priority in the land-for-land alternative. If land-for-land is unavailable, an additional relocation allowance of 500 days of the agricultural wage per household will be provided.
Loss of access to forestland	Affected household with forestland access	Provision of alternative facilities and technical assistance	Households losing access to forestland for their basic needs such as fuel, fodder, etc. will be given access to alternative forest land. Communities will be involved in community social forestry schemes coordinated by the Department of Forests. Vulnerable affected persons will be provided assistance by the Project for alternative sources of fuel, fodder, etc. that will minimize their traditional dependency on forests.
Loss of traditional use rights, community land, or	Affected households with traditional land rights	Provision of equivalent land within the village, provision of functional equivalence, or augmentation of existing	Affected persons losing their community land or pasture land will be provided alternative land for similar use or suitable replacement or augmentation of existing access will be provided based on community consultation.

[4] Powergrid's *Environmental and Social Policy and Procedures* were used to inform the resettlement framework entitlement design.

Losses	Affected Persons	Entitlement	Details
pasture land		access	
Loss of residential structures	Owners of structures with and without titles	Compensation at replacement cost Resettlement assistance	Compensation based on the LAA (same amount awarded to affected persons with and without titles) A grant will be provided by the Project equivalent to the depreciation calculated by the LAA to reflect market or replacement value of structures. A lump sum transition allowance of Rs5,000 will be provided for each displaced household. Affected persons will have the right to salvage material from demolished structures. The Project will provide vulnerable affected persons with additional lump sum assistance of Rs25,000 for construction.
	Individual tenant or leaseholder	Rental assistance	Lump sum assistance to reestablish residence equivalent to 6 months of rent or Rs5,000, whichever is higher, per household.
Loss of commercial structures	Owners of structures with and without titles	Compensation at replacement cost Resettlement assistance	Compensation based on the LAA (same amount awarded to affected persons with and without titles) A grant will be provided by the Project equivalent to the depreciation calculated by the LAA to reflect market or replacement value of structures. A transition allowance equivalent to 1 year of minimum wage income plus Rs5,000 will be provided for each household with displaced commercial structures Affected persons will have the right to salvage material from demolished structures
	Individual tenant or leaseholder	Rental assistance	A transition allowance equivalent to 1 year of minimum wage income plus Rs5,000 will be provided for each household.
Income from standing crops, rent, or sharecropping	Farming households, sharecroppers, and tenants	Notice to harvest standing crops Compensation at market value	Compensation at market value for crops. An assistance grant equivalent to Rs5,000 for the purchase of agricultural inputs for the next season. Preferential employment in the Project will be provided to vulnerable households.
Income from affected businesses and wage earnings	Affected individuals	Compensation and income restoration	Compensation equivalent to 625 days of minimum wages, preferably in the form of income-generating schemes or in productive units in the names of both spouses Needs-based, short-term training in entrepreneurial skills. Preferential employment in the Project will be provided to vulnerable households.
Income from trees or perennial crops	Affected households	Compensation at market value	Perennial crops, including fruit-bearing trees, will be compensated based on 8 years of income at market value as determined by the Horticulture Department. Trees will be compensated at three to five times the market value determined by the Forest Department for timber species and by the Horticulture Department for other trees.
Income from forest products and grazing land	Affected households	Lump sum compensation	Lump sum compensation for lost income for 3 months based on income from the forest or grazing land determined by the resettlement committee in consultation with affected persons.
Community and cultural sites	Affected households or individuals	Conservation, protection, and compensatory replacement (schools, community centers, markets, health centers, religious and worship sites, burial sites, rights to food, medicine, natural resources)	Impacts will be documented and mitigated based on the principles agreed on in the resettlement framework. Cultural properties will be conserved through special measures, such as relocation in consultation with the community.

Losses	Affected Persons	Entitlement	Details
Losses not identified	Affected households or individuals	Additional assistance	Unforeseen impacts will be documented and mitigated based on the principles agreed on in the resettlement framework.

LAA = Land Acquisition Act.

a. The difference between the replacement value and the assessed value will be provided by the Project directly to affected persons in the form of a grant. The payment of compensation above assessed values has been confirmed by UED and is consistent with similar payments made by the Uttaranchal government for the Tehri Dam Project and payments made in Powergrid projects. The main responsibilities of the district-level resettlement committees will monitor implementation and ensure the valuation of replacement costs. Each committee will consist of (i) a district magistrate; (ii) a district land acquisition officer; (iii) a local revenue officer; (iv) a PMU resettlement specialist; (v) a PIU resettlement specialist; (vi) an elected village head; (vii) representatives of affected persons, including vulnerable groups; and (viii) NGO representatives. The determination of replacement cost will consider a detailed rate analysis to be undertaken to verify local market rates (based on land transactions in the area in the last 3 years) and government rates prevalent in the region. The government-registered price will be ascertained from registry documents. For lease rates and grazing land rates, the resettlement committee will consult with affected persons to assess the replacement value against the assessed value.

Sources: Asian Development Bank, Power Transmission Corporation of Uttaranchal, Limited, Uttaranchal Jal Vidyut Nigam, Limited.

5. As identified in the entitlement matrix, special assistance will be provided to vulnerable groups. This includes prioritization in land-for-land compensation schemes; provision of additional allowances for house reconstruction, relocation, and income losses; specialized training; and prioritization for employment in project activities.

C. Procedure for Resettlement Plan Preparation

6. Resettlement plans for non-core subprojects will be prepared in the following manner: (i) the PIU, guided by the PMO, will undertake social impact assessment surveys for identified subprojects based on preliminary technical designs; (ii) if impacts are significant,[5] full resettlement plans will be prepared for each subproject; (iii) if impacts are not significant, short Resettlement Plans will be required for project preparation; and iv) resettlement plans will include measures to ensure that women's socioeconomic conditions, needs, and priorities are identified and that the process of land acquisition and resettlement does not disadvantage women.[6] The PIU, PMO, and consultants for project preparation and implementation will include social specialists familiar with ADB policy and procedures for the preparation of subproject resettlement plans. The resettlement plans must comply with this agreed resettlement framework. The resettlement plans for core subprojects will be used as a model for preparing and implementing noncore subprojects. The draft resettlement plans will be submitted to ADB for review and approval prior to contract award, and compensation will be paid to all affected persons prior to displacement, or in any case, no later than the commencement of civil works.[7]

D. Institutional Arrangements and Budget

7. For subproject resettlement plans, the PMO will have overall coordination, planning, implementation, and financing responsibilities. The PMO will set up an environment and social department. The department will have a full-time resettlement specialist for the duration of the projects under the MFF to head the department's Resettlement Unit who will ensure timely and

[5] Resettlement is significant when 200 or more people experience major impacts. Major impacts are defined as people being physically displaced from housing and/or losing 10% or more of their productive, income-generating assets.

[6] UED and the implementing agencies, through the PMO and PIUs, will ensure that this agreed on resettlement framework is closely followed during the preparation of resettlement plans. UED and the implementing agencies will further ensure that resettlement budgets are delivered on time to the PMO, PIUs, and involved NGOs for timely implementation of resettlement plans.

[7] PMO, through the PIUs, will set the cutoff date on the day of notice (LAA, Section 4).

effective implementation and supervision of resettlement plans. The Resettlement Unit's resettlement specialist and staff and the PIU's resettlement specialist and staff will be provided with the necessary training. The PMO will coordinate the PIUs in activities related to subproject resettlement plans, and each PIU will have at least one full-time resettlement specialist for the duration of those activities with relevant skills, a background in social sciences, and experience with resettlement issues. The PIU resettlement specialist will subsequently be engaged on a part-time basis for follow-up activities, monitoring, and grievance redress. UED and the implementing agencies will ensure that key institutions, including local governments, are involved in the implementation of resettlement plans. Moreover, in recognition of the complexity of resettlement in a sector project, experienced nongovernment organizations (NGOs) (with field offices) will be hired to implement resettlement plans with clearly defined tasks, including community-based social development programs. Local-level resettlement committees will be formed to ensure that all stakeholders are represented—especially affected persons; vulnerable affected persons; community-based organizations, NGOs, and other civil society and interest groups; local governments; village leaders; and PIU staff—in decision making and the implementation of resettlement plans.

8. Detailed budget estimates for resettlement will be prepared for each resettlement plan by UED and the implementing agencies and will be included in the overall investment estimate.[8] All land acquisition funds will be provided by UED. All compensation, relocation, and rehabilitation of income and livelihoods will be considered as an integral part of subproject costs. Budgets shall also include provisions for engaging an external monitor.

E. Consultation, Disclosure, and Grievances

9. Resettlement plans for each noncore subproject will be prepared and implemented in close consultation with stakeholders, particularly affected persons, through focus group discussions, socioeconomic surveys, and stakeholder consultation meetings.[9] The resettlement framework will be made available in the local language for focus group discussions and stakeholder meetings at the village and community levels to ensure inputs from stakeholders. A resettlement information leaflet containing information about compensation and resettlement options for noncore subprojects will be made available in the local language and distributed to affected persons. The PMO, through its Resettlement Unit and PIUs, will conduct consultations in affected villages to explain the noncore subproject resettlement plans in coordination with village and community leaders. Each affected person will be given information about specific entitlements. Disputes about entitlements can be forwarded to the PIU for action. Resettlement plans will be disclosed on ADB's web site. Information, dissemination, and consultation will continue throughout project implementation. The resettlement framework and resettlement plans for appraised subprojects have been disclosed to affected persons.

10. A grievance redress committee will be formed to ensure that affected persons' grievances are addressed and to facilitate project implementation.[10] Grievance redress committees will have representatives from affected persons, particularly vulnerable affected

[8] The budget will include (i) detailed costs of land acquisition, relocation, and livelihood and income restoration and improvement; (ii) source of funding; (iii) arrangements for approval; and (iv) flow of funds and contingency arrangements.

[9] Female-headed households will be handled carefully. The NGO will hire female field workers for information dissemination. Focus groups and personal contacts are important for information campaigns for female affected persons.

[10] The main responsibilities of these committees are to (i) provide support to affected persons on problems arising from land and property acquisition; (ii) record affected persons' grievances, categorize and prioritize grievances, and resolve them within 2 weeks; (iii) immediately inform the PMO of serious cases; and (iv) report to affected persons on developments regarding their grievances and decisions of the committee and the PMO.

persons; local-level implementing agency and PIU staff; local government; respected citizens; NGOs; community-based organizations, and local civil and interest groups. The grievance redress committee will meet every 2 weeks. Other than disputes about ownership rights under the court of law, the grievance redress committee will review grievances involving resettlement benefits, compensation, relocation, and other assistance. Detailed investigation, including field investigation with the concerned affected persons, will be undertaken. Grievances will be redressed within 2 weeks from the date a complaint is lodged. The committees will operate throughout the Project's life.

F. Monitoring and Evaluation

11. Internal monitoring will be the responsibility of the Resettlement Unit through the PIUs and pertinent NGOs.[11] Monitoring and evaluation reports documenting progress on resettlement and resettlement plan completion reports will be provided by the Resettlement Unit to ADB as part of quarterly progress reports. UED will engage an independent agency not associated with project implementation to undertake external monitoring and evaluation. The external agency, which will have experience with resettlement activities and be familiar with Government and ADB resettlement policy, will be engaged with ADB concurrence within 3 months of loan effectiveness. The agency will monitor the implementation of resettlement plans to assess whether resettlement goals were achieved and whether livelihood and living standards were restored. The agency will also provide recommendations. External monitoring will be on a quarterly basis and impact evaluation will be on a sample basis during midterm and project completion.[12]

[11] The internal monitoring of the Resettlement Unit will include (i) administrative monitoring; (ii) socioeconomic monitoring; and (iii) impact evaluation, that is, whether incomes have been restored and/or improved and the situation of affected persons.

[12] Monitoring will also record affected persons' views about resettlement issues; affected persons' understanding of entitlement policies, options, and alternatives; site conditions; compensation valuation and disbursement; grievance redress procedures; and staff competencies. External monitoring will evaluate the performance of the Resettlement Unit, PIU, and NGOs. The external agency will report simultaneously to UED and ADB twice a year.