PROJECT INFORMATION DOCUMENT (PID)
APPRAISAL STAGE

<table>
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<tr>
<th>Project Name</th>
<th>Fifth Power System Development Project</th>
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<td>Sector</td>
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<td>Project ID</td>
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<td>Borrower(s)</td>
<td>POWERGRID CORPORATION OF INDIA LIMITED</td>
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<td>Environment Category</td>
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<td>Date PID Prepared</td>
<td>May 7, 2009</td>
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<td>Date of Appraisal Authorization</td>
<td>May 5, 2009</td>
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<td>Date of Board Approval</td>
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1. Country and Sector Background

India has not been immune to the recent global economic turbulence. After the financial crisis hit, external credit dried up, and the stock market lost more than half its value. Then, in late 2008 and early 2009, industrial production slowed and exports declined. GDP growth is slowing down significantly from 9% on average in the last 4 years to 5-6%. With inflation at close to zero and a modest external current account deficit, there is scope for further expansionary policies. This project is part of the Bank’s response to the Government of India’s request for a crisis response package of about US$6 billion which comprises additional financing for infrastructure investment and financial sector strengthening.

The Government of India (GoI) has identified the power sector as being vital for sustained and inclusive economic growth. Access to energy and ensuring the provision of lifeline energy to all in a cost effective manner is essential for achieving this objective. Currently about 56% of all households in India have access to electricity – including 88% in urban areas and 44% in rural areas. Average annual per capita consumption of electricity for 2007-08 was 734 units (kWh) – far below the world average of 2,429 units. In addition, the Indian power sector is facing a growing demand-supply mismatch. At the end of March 2008, average peak deficit was estimated at 16.6% whereas the energy deficit was only 9.9 percent. All regions in the country are facing a demand-supply deficit that varies between 9 and 23 percent. Power shortages are an indicator of insufficient generation capacity as well as inadequate transmission and distribution networks. As the country’s energy resources are spread unevenly across the country, there is a need for regional cooperation within India and between India and its neighbors – and an adequate transmission system for meeting demand and enhancing energy security.

To achieve its goal of “Power for All by 2012”, GoI has embarked on an ambitious investment and institutional development program to add generation capacity (increasing it to 200 GW from the present level of 147 GW, by mobilizing to the maximum extent possible, private sector investment), expand and strengthen transmission and distribution networks, and

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1 As per CEA General Review 2006
2 As defined in the National Electricity Policy 2005
improve the technical and commercial efficiency of power utilities. The GoI's 11th Plan and the Integrated Energy Policy (2006), aims to maximize the development of renewable and other cleaner energy options while the National Action Plan on Climate Change (June 2008) identifies complementary efforts in solar energy and energy efficiency. Even with aggressive efforts by GoI to increase the share of renewable energy, large hydro and nuclear plants in the generation mix, coal-fired generation plants will continue to dominate energy supply to the grid at least for the next few decades, given the large domestic coal resources and the absence of any other significant domestic energy sources in the country. However, India is increasingly moving towards the use of supercritical technology for coal plants, including under its private sector-led program for Ultra Mega Power Plants (UMPP). The GoI is planning to develop at least nine coal-fired UMPPs, each of 4000 MW capacity, through private competitive bidding, four of which have already been awarded.

An expansion and strengthening of the national transmission network is needed for this additional power to reach to the entire country and for energy security. While State governments are responsible for improving rural access and strengthening electricity distribution systems, these efforts are being supported by national legislation and policies (including the Electricity Act 2003) and centrally-sponsored schemes (such as the Rajiv Gandhi rural electrification program and the Second Accelerated Power Development and Reform Program).

The focus of GoI's 11th Plan with respect to the transmission system is to strengthen the existing system and further augment the all-India National Grid that will help the government achieve its objective of 'Power for All by 2012' at affordable prices. Such an integrated national grid will facilitate optimal utilization of unevenly distributed generation resources in the country through inter-regional power transfer. This together with open access in transmission would facilitate increased trading in electricity resulting in market determined generation dispatches, and hence, in supply of power at reduced prices to the distribution utilities and ultimately to the consumers.

The national transmission expansion plan is estimated to cost Rs 75,000 crore (approximately US$16.5 billion), of which POWERGRID - the national transmission system operator - is mobilizing Rs 55,000 crore (approximately US$12 billion) on its balance sheet (from internal resources and debt, including from the international financial institutions), and the remaining investment is expected to be brought in by private investors. By the end of the 11th Plan, the cumulative transmission network of POWERGRID is targeted to increase by 60,000 circuit kilometers for a total of 120,000 circuit kilometers, having an inter-regional power transfer capacity of more than 37,000 MW which is 14,100 MW more than at the end of 10th Plan, and carrying 60% (currently at 45%) of power generated in the country.

3 Under the 11th Plan, the GoI targets are to increase renewable energy (biomass, small hydro and wind) from their current share of 4% to 10% of installed capacity by 2012, and to install additional hydro capacity of 15,000 MW by 2012. By 2025/26, the GoI plans to accelerate hydro development by adding 50,000 MW of new large hydro capacity, and by 2031-32, the entire hydro potential of 150,000 MW should be developed.

4 At the macro-economy scale, India is a low-intensity producer of CO2 emissions. Its per capita CO2 emissions are among the lowest in the world with around 1 metric ton (MT) per person compared with 4 for the world average and 20 for the United States. Within India, the power sector accounts for about one-third of CO2 emissions in a year due to its heavy reliance on coal.

5 At Exchange Rate of 1 USD = Rs. 45
The expansion of POWERGRID is impressive. In the 15 years or so since it commenced commercial operation, POWERGRID has achieved manifold growth and has contributed significantly towards development of the Indian power sector. Through steady improvements in planning, operations, management and overall governance, POWERGRID now serves as an institutional role model for other transmission companies in India. It operates and maintains one of the largest extra high voltage transmission systems in the world, with state-of-the art national and regional load dispatch centers. In recognition of its sound governance practices and contribution to the overall development of India’s power sector, the Government of India conferred the coveted “Navratna” status on POWERGRID in May 2008, the highest honor for a public sector enterprise. This reflects GoI’s confidence in POWERGRID’s capability and its ability to discharge enhanced responsibilities. In addition to its core transmission functions, POWERGRID is providing consultancy both at the national and international level (notably in Afghanistan) by utilizing its in-house expertise in the field of planning, engineering, contracting, financial and project management, load dispatch and communication, and telecommunication for transmission systems.

2. Objectives

The project development objective is to strengthen the transmission system in order to increase reliable power exchanges between regions and states of India. In order to achieve this objective, the project would strengthen the transmission system in the power deficit regions and increase inter-regional transmission capacity.

3. Rationale for Bank Involvement

The proposed project builds on a successful partnership with an organization which is vital to the development of India’s power sector – the national electricity transmission company. This engagement also complements other elements of the Bank’s sector strategy (see below). The Bank has partnered with POWERGRID since its inception in 1989. Not only has it financed its investment programs, but it has also supported the company’s ongoing efforts to achieve world-class operations and management, and leverage private participation (including with IFC financing of the Bhutan/Tala-Delhi transmission line). Under a series of Power System Development Projects, the Bank has provided four direct loans plus one additional financing to POWERGRID to date: PSDP I in 1993, PSDP II in 2001, PSDP III in 2006 and PSDP IV (including additional financing) in 2008. These loans, together with loans transferred to POWERGRID from its parent entities amount to about $3.1 billion. It is noted that Internal Evaluation Group (IEG) ratings for the assessment of outcomes for PSDP I and II were satisfactory and highly satisfactory, respectively, with highly satisfactory performance by both the Bank and POWERGRID under PSDP II. In addition, PDO and implementation ratings for the ongoing PSDP III and IV projects are satisfactory.

The country strategy highlighted that the global financial crisis has resulted in a tightening not only of international credit markets but also of domestic credit markets in India, an increased cost of debt (by at least 20-30% compared to earlier in 2008) for domestic investors, and a reduced availability of both debt and risk capital for infrastructure projects. In addition, the difficulty for sovereign-backed entities in accessing longer-term financing provide important opportunities for India’s development partners, such as the World Bank Group, to come up with
creative solutions in a timely and selective manner to scale up funding in support of India’s efforts to bridge its infrastructure financing gap. While POWERGRID is not facing a problem in raising domestic financing currently (it had a $500 million equivalent bond issue in 2008/9 oversubscribed 1.8 times and will need to raise about another $3 billion in the domestic capital markets over the next four years), it is not yet clear how the financial crisis may impact POWERGRID in the future. This project will provide a critical piece of the overall financing plan for GoI’s 11th Plan.

In parallel with the proposed operation, the Bank is also focusing on: (i) expansion of “cleaner” energy production (hydropower, including the on-going Rampur Hydropower Project, the proposed Vishnugad Pipalkoti Hydro Electric Project (FY10) and the proposed Luhri Hydro Electric Project (FY12); cleaner coal, primarily the Coal-Fired Generation Rehabilitation Project, which represents the first phase of the National Energy Efficiency Renovation and Modernization Program (to address efficiency issues at about 27,000 MW of old generation capacity identified); and renewables (on-going analytical work to define strategy); (ii) expansion of transmission capacity at the state level (proposed sub-sovereign lending to Maharashtra State Electricity Transmission Company Ltd – FY 09); (iii) strengthening governance of electricity distribution, including improving efficiency and quality of electricity services in selected states (proposed Haryana Power System Improvement Project – FY10); and (iv) improving electricity access and quality of services in rural areas (analytical work underway).

4. Description

The project will finance five regional transmission schemes for strengthening of transmission system and/or facilitating inter-regional power exchange for the National Grid. The five schemes are as follows:

- System Strengthening in Western Region for Sasan Ultra Mega Power Project (UMPP)
- System Strengthening in Western Region for Mundra UMPP
- System Strengthening in Northern Region for Sasan and Mundra UMPP
- System Strengthening in Southern and Western Region for Krishnaptanam UMPP
- Transmission System for South-West Interconnection

While the names of the various schemes refer to three ultra mega power projects (UMPPs), they are not associated facilities as these transmission investments are mostly required to facilitate the transmission of power to meet demand in other regions of the country. By design, the operations of the UMPPs are not dependent on the construction of the regional transmission schemes. Indeed, the first three schemes are being constructed to meet the demand in the Western and Northern Regions where the Sasan UMPP and Mundra UMPP are physically located. Both plants are expected to be commissioned in 2012-13. To facilitate the exchange of power between regions, the transmission networks have to be strengthened in the western,
northern and central part of the national grid system, as the difference in demand profiles across regions requires large bulk power transfers over short periods of time and the transmission networks need to have significant available transfer capacity to sustain them.

Similarly, the fourth scheme relates to another 4000 MW (5 x 800 MW) UMPP to be located at Krishnapatnam, Andhra Pradesh, in the Southern region which is also planned to be commissioned in 2012-13. The power from this project will be transferred to load centers in Southern and Western Regions. The fifth scheme – the South-West Interconnection – will transfer power surpluses in the Southern region to deficit regions in the West. By 2011-12, surpluses are projected to be 2000 MW at peak periods and 7500 MW at off-peak periods.

5. Financing

Source: International Bank for Reconstruction and Development
Borrower

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6. Implementation

POWERGRID has over the last decade acquired and developed the skills required to successfully plan and implement large transmission schemes. All the schemes envisaged under this operation are being designed, engineered and implemented by POWERGRID. Local and foreign contractors engaged through international competitive bidding will carry out supply, installation and erection works.

Implementation arrangements will include the use of the practices institutionalized under the previous loans including the use of dispute review boards for complex schemes and institutional oversight by the Ministry of Power (MoP) and the Ministry of Finance (MoF). The Central Electricity Authority (CEA) is responsible, *inter alia*, for sector planning and the Central Electricity Regulatory Commission (CERC) is responsible for tariff formulation and notification as well as sectoral regulation. Both these agencies will follow their usual procedures with respect to the project investments.

Use of Borrower Systems. POWERGRID has institutionalized a systematic approach to environmental management in the course of its long association with the Bank. It has developed and refined (in 2005 and 2009) its Environmental and Social Policies and Procedures (ESPP) that applies to all its transmission projects to reflect its understanding of the issues, and their proactive management as the premier transmission utility of India. POWERGRID has also appointed a committee of independent and eminent experts to oversee the ESPP implementation across its projects irrespective of funding source. The World Bank reviewed POWERGRID’s ESPP to establish its equivalence and acceptability for use as a Borrower System with reference to each safeguard policy of the World Bank. The Safeguards Diagnostic Report (SDR) for POWERGRID accepting its ESPP as the use of Borrower Systems under OP 4.00 and the ESPP have been publicly disclosed at the Bank’s Infoshop and on POWERGRID’s website. It is noted that the SDR recommends that five of the six policies triggered be implemented under OP 4.00.
It does not include the Indigenous Peoples Policy (OP 4.10) since there is not yet enough information regarding POWERGRID's performance in this regard.

POWERGRID is also being considered for a pilot under Increased Use of Borrower System for procurement. However, the project is being prepared following existing conventional procurement procedures as per the Bank Guidelines since it will take some time to complete the required assessments – only recently initiated – of POWERGRID’s procurement policies, procedures and actual performance. The decision to pilot Increased Use of Borrower Systems will be subject to internal Bank validation and approval following the completion of the assessments and agreement with POWERGRID on the actions required for filling any gaps identified as a result of such assessments.

**Sustainability**

POWERGRID’s technical expertise and extensive experience in operation and maintenance of transmission network should contribute to sustainability of investments. POWERGRID has been able to maintain above 99% availability during the last few years and has been rewarded by the regulator for their performance. POWERGRID uses sophisticated techniques and state-of-the-art technology in the operation and maintenance of its assets. Its maintenance activities are ISO certified, and systems and procedures are revised periodically to keep abreast with the latest technology.

Other critical elements of sustainability include the ability of POWERGRID to finance and implement the large investment program envisaged under the National Electricity Plan and to properly operate and maintain investments undertaken within the framework of this project. GoI’s and POWERGRID’s continued commitment to India’s ongoing program of power sector restructuring, and particularly the implementation of the mandate of the Electricity Act 2003 is instrumental for achieving long-term sustainability. The GoI, CERC and POWERGRID have reaffirmed their commitment to the implementation of the Act. POWERGRID’s commitment is also evident in their performance in the implementation of on-going Bank-supported projects.

POWERGRID has successfully managed to mobilize financing and substantially scale-up investments in expanding the national power grid. Relative to the 9th Plan, during the 10th Plan POWERGRID increased the new power lines commissioned by 20% and the capacity of new substations by about 50 percent. The 11th Plan has even more ambitious targets to double transmission lines and substations in comparison to the 10th Plan. Also, in spite of the financial crisis, POWERGRID has been able to raise necessary financing to meet its targets through divesting equity and raising debt from the domestic market and IFIs. POWERGRID’s management believes that there is sufficient liquidity in the Indian market for highly rated institutions such as POWERGRID which has the highest rating from three credit rating agencies in India. However, given uncertainty surrounding market conditions, the Bank jointly with POWERGRID will continue to closely monitor the situation and if necessary consider alternative solutions.

A sound financial position should allow POWERGRID to continue carrying out adequate operation and maintenance of assets. POWERGRID’s profitability has been steadily improving mainly due to efficient operations within a facilitative regulatory framework. The securitization
scheme introduced by GoI in September 2001, bulk power transmission agreements which are signed with beneficiaries in advance of commencing construction works, and the generally improving sector performance and financial situation in most of the states over the last few years have done much to improve financial performance of POWERGRID and allowed it to adequately finance operation and maintenance of the grid. According to the recently approved five-year tariff, most risks – including foreign exchange rate and interest rates – remain a pass-through in POWERGRID’s regulated tariff. The company is forming a task force to look at the implications of potential regulatory changes for the future. The Bank team will provide necessary assistance through the ongoing partnership and implementation support.

7. Lessons Learned from Past Operations in the Country/Sector

Most lessons documented for PSDP IV and earlier PSDP operations remain relevant. Specifically:

(a) POWERGRID values Bank support to further enhance its institutional capacity and good financial performance. With significant institutional capacity enhancements and a consistently robust financial performance, POWERGRID is in a position to raise resources from a multitude of financial institutions. However, POWERGRID continues to value partnership with the Bank for the following reasons: (i) Bank’s continuing role in strengthening the company’s institutional capacity, including through the Bank’s oversight of fiduciary and safeguards’ aspects of project implementation; and (ii) the Bank’s contribution in introducing innovative concepts and global good practices to support the development of India’s power sector⁸;

(b) Bank’s engagement with POWERGRID provides leverage on sector policy. Through continuous engagement with POWERGRID since its inception in 1993, the Bank has contributed both to the emergence of a well-managed company and to helping shape key policy and regulatory reforms; and

(c) Need for flexibility in Bank products. Large clients in middle income countries may still benefit from Bank support. However, Bank products offered to such clients would need to reflect flexibility in approach, keeping in perspective the established institutional capacities of such clients and the need for efficient loan transaction costs, especially processing times.

Additional lessons are:

a. Need for flexibility in providing technical assistance for institutional strengthening. When dealing with experienced clients, the provision of advice on institutional

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⁸ For example, the partnership with the Bank has helped POWERGRID to adopt a comprehensive corporate environment and social safeguards policy. One of POWERGRID’s most successful achievements has been in managing and protecting the environment. It has taken several technological innovations aimed at minimizing damage to natural resources and human habitat. POWERGRID uses geographical information system (GIS) and satellite imagery to determine transmission line routes, and sites for substations. In sanctuaries and protected forests, this saved much green area from being cleared.
strengthening is more effectively provided through the Bank’s on-going long term engagement than through a specific financing component for technical assistance; and

b. Use of borrower systems is a win-win approach. Use of borrower systems in environmental and social policies, and in procurement, helps the Bank to mainstream best practices and also make the Bank’s financial instruments more flexible and attractive.

8. Safeguard Policies (including public consultation)

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9. List of Factual Technical Documents

- Project Implementation Plan for “System Strengthening in Western Region for Sasan Ultra Mega Power Project”
- Project Implementation Plan for “System Strengthening in Northern Region for Sasan and Mundra Ultra Mega Power Projects”
- Project Implementation Plan for “System Strengthening in Western Region for Mundra Ultra Mega Power Project”
- Project Implementation Plan for “System Strengthening in Southern and Western Region for Krishnaptanam Ultra Mega Power Project”
- Project Implementation Plan for “Transmission System for South-West Interconnection”

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

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