



Meeting India's demand for electricity

IBRD Results

SYNOPSIS

The national power transmission utility, Power Grid Corporation of India Limited (POWERGRID), has tapped IBRD funding and technical assistance over years in its efforts to address India's significant energy shortages. This partnership has helped direct more power to local regions in need from those with an energy surplus, and laid many thousands of kilometers of new transmission lines.

Challenge

India faces an acute deficit of electric power. Almost half of all Indian households do not have access to electricity. Average annual per capita consumption of electricity in India was only about 30 percent of the world's average in 2007 and 2008. Generation capacity is insufficient to meet the existing demand for electricity, and transmission and distribution networks that carry power to consumers are inadequate. As India's energy resources are spread unevenly across the country, the efficient transmission of power from surplus to deficient regions is critical. There is, therefore, a pressing need to strengthen and expand the all-India national transmission network—the national grid.

Results

IBRD has been involved with India's current energy program for more than a decade, using innovative financing and technical advice to assist the Indian government and its power transmission utility. Implementation of all World Bank-financed projects with POWERGRID is progressing well and they have successfully achieved all development objective indicator targets in recent years. For the fiscal year to June 30, 2009, results include:

- 46,027 million kilowatt hours of power exchange between and across the regions against a target of 46,000 million kilowatt hours;
- 71,447 circuit km of transmission capacity against a target of 71,000 circuit km; and
- 79,522 Megavolt Ampere (MVA) of transformation capacity against a target of 75,000 MVA.

Also, the National Load Despatch Centre, the apex body to ensure integrated operation of the national power system, commenced operations as targeted in April 2009. India's electricity transmission system operator is also consistently maintaining transmission system availability at over 99 percent, which is at par with international utilities.

Power Grid Corporation (POWERGRID) has tripled its transmission network and is now one of the world's largest electricity transmission system operators.

The Bank has developed a successful partnership with POWERGRID, India's national electricity transmission company and as such, an organization vital to India's energy future. The Bank has partnered with POWERGRID since its inception in 1989. Not only has it financed its investment

programs, but it has also supported POWERGRID's ongoing effort to achieve world-class operations and management. IBRD also has worked with POWERGRID to leverage private sector participation, which includes financing from the International Finance Corporation of the Bhutan-India Tala transmission system. Under a series of Power System Development Projects (PSDP), the Bank has provided five direct loans to POWERGRID to date: PSDP I in 1993, PSDP II in 2001, PSDP III in 2006, PSDP IV and additional financing for PSDP IV in 2008, and PSDP V in 2009. These loans, together with loans transferred to POWERGRID from its government parent entities, amount to about US\$4.1 billion.

Through steady improvements in planning, operations, management and overall governance, POWERGRID now serves as an institutional role model not only for other transmission companies in India, but for other state-owned enterprises in developing countries. It is playing a major role in an inter-regional transmission network across various South Asian countries. In 2009, POWERGRID energized the Chimatala substation in Kabul, Afghanistan, within the scheduled time despite rough weather and effects of the continuing conflict. In New Delhi in January 2010, POWERGRID hosted a meeting on an India-Nepal power transmission corridor, attended by officials from the Government of Nepal, a Central Public Sector Utility (CPSU) from India, etc. POWERGRID is also providing national and international consultancy services, notably in Afghanistan.

POWERGRID now seamlessly transmits power from surplus to deficient areas across a network of sub-continental magnitude. Today, hydropower from Arunachal Pradesh in the far east of the country is carried on specially-designed transmission lines through the narrow 'Chicken's Neck' near Siliguri to light homes in Uttar Pradesh; power engineers in Tamil Nadu in the deep south keep close tabs on the weather forecast for Punjab in the north to assess opportunities for power trading; and the gas-based Kayamkulam power station located at the southern tip of the Indian mainland is activated in winter to warm the freezing nights in Kashmir.

One of POWERGRID's notable achievements has been in managing and protecting the environment. Several techno-



logical innovations have been undertaken to minimize damage to natural resources and human habitat. Geographical Information System (GIS) and satellite imagery are used to determine the routes for transmission lines and sites for substations. In sanctuaries and protected forests, this has saved many areas from potentially being cleared. While building a transmission line through a protected national park, extra high towers were designed to reduce the number of trees that had to be felled. Whether it has been ensuring the mandatory use of Chlorofluorocarbon (CFC)-free equipment and thus contributing to the fight against ozone depletion and global warming, or planting new forests on large tracts of land in almost all substations, POWERGRID has been alive to its green obligations.

Approach

IBRD has focus on tailoring its financial and technical support to India's particular needs in the energy sector. For example, POWERGRID borrows IBRD funds directly from the Bank as Specific Investment Lending (SIL), with a guarantee from the Government of India.

Between 1993 and 2003, the Bank concentrated its efforts in helping develop the national transmission network by strengthening regional grids, facilitating the transfer of power across the regions through POWERGRID. During this period, the Bank also started focusing on renewable energy-based generation through its engagement with Indian Renewable Energy Development Agency Limited (IREDA). It also spent considerable time supporting reform measures in five Indian states with support from bilateral

donors, although this experience proved unsatisfactory. The next phase of lending started after 2006 when the Bank adopted a balanced approach focusing on generation and transmission, with selective engagement in distribution. It also started building knowledge partnerships to assist the government in areas including rural electrification, thermal Rehabilitation and Maintenance (R&M), regulatory reforms, institutional development, governance aspects, and clean energy including renewable energy and hydropower. In 2007, the Rampur hydropower project marked the first Bank-financed hydropower development in India since 1989. Recently, the Bank has been involved with various central and state sector utilities in capacity building and institutional strengthening exercises either as a part of lending or as advisory and analytical activities.

Summary Timeline

- 1993:** Power System Development Project I (PSDP) 2001: PSDP II
- 2006:** PSDP III
- 2008:** PSDP IV and additional financing for PSDP IV in 2008
- 2009:** PSDP V

IBRD Contribution

IBRD has financed POWERGRID's investment programs with cumulative assistance of US\$3.2 billion to date.

Engagement of World Bank Group

The IFC is financing the Bhutan/India Tala transmission system as part of the POWERGRID's investment program.

Partners

The Asian Development Bank (ADB) is also financing part of POWERGRID's investment program, in parallel to parts of the program to be financed by the IBRD.

Next Steps

In response to the global downturn and at the request of the Government of India, the World Bank extended a loan of US\$1 billion to Powergrid on September 22, 2009. The loan will help Powergrid to strengthen five transmission systems in the northern, western and southern regions of the country. This will facilitate the transfer of power from energy surplus regions to towns and villages in under-served regions of the country. This will also increase the integration of national grid, resulting in increased system reliability and a reduction in transmission losses.

With the Government of India embarking upon an ambitious program to increase power generation and bring electricity to all by 2012, there is a pressing need to augment and strengthen the existing transmission network so that this additional power reaches the entire country efficiently. According to plans, the cumulative transmission network of Powergrid is targeted to increase substantially over the 11th Plan (2007–12) allowing Powergrid to transfer 60 percent of power generated in the country as against 45 percent today.

By the end of the 11th Plan, the cumulative transmission network of POWERGRID is targeted to increase by 40,000 circuit km for a total of 100,000 circuit km, having an inter-regional transfer capacity of more than 37,000 MW (currently at 20,750 MW) and carrying 60 percent (currently at 45 percent) of power generated in the country.