

# Policy and Private Finance Work Together: World Bank/GEF India Renewable Resources Development Project<sup>1</sup>

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## Project Summary

project type:	renewable energy
location:	India
sources of financing:	World Bank/GEF
project developer:	World Bank/GEF

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## Introduction

During the 1990s, favorable national tax policies and power-sector regulatory changes greatly improved the investment climate for renewable energy technologies in India. In parallel with these changes, the Government of India, the World Bank and the Global Environmental Facility (GEF) supported a renewable energy development project with the aim of improving commercial markets and financing for wind, mini-hydro, and solar PV technologies. The project, along with Danish and other assistance, allowed a strengthened India Renewable Energy Development Agency (IREDA) to promote and finance private-sector renewable energy investments. IREDA did this by conducting marketing campaigns, offering business training, providing various types of credit and subsidies at different parts of the market, and offering other financial incentives.

The project improved the characteristics of the renewable energy market in India, particularly for wind and small hydro power. Direct project and associated commercial financing resulted in the commissioning of 360 MW of commercially- operated wind capacity and 65 MW of mini-hydro capacity. Results in the PV sector have been less than hoped for, but still more than 2,200 residential solar home systems and solar lanterns were financed with IREDA support, with more expected. In West Bengal, the

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<sup>1</sup> This case study is built from: "Case Study: World Bank/GEF India Renewable Resources Development Project" and "The GEF Portfolio of Grid-Connected Renewable Energy: Emerging Experience and Lessons," Eric Martinot, Global Environment Facility, Washington, DC, 2000. A version of this case appeared in *Technology without Borders: Case Studies of Successful Technology Transfer* by the International Energy Agency (Paris, 2001).

project demonstrated five solar power systems of 25 kWp each, which supply electricity to about 500 families connected into village-scale mini-grids, managed and maintained by cooperative societies.

### **Helping the Private Sector Create a Market for Renewables**

A project that only provides direct financing for renewable energy technology would have limited impact. But the project also raised awareness among investors and banking institutions of the viability of wind power and other renewable energy technologies, which was a key project goal. As a result, many financial institutions themselves began to offer financing for renewable energy technologies. IREDA-sponsored business meetings and training programmes attracted more than 2,000 participants from state agencies, investors, and banking institutions. These meetings were supplemented by informational publications and media advertisements that helped small and medium scale enterprises market their renewable energy products. IREDA developed and published several 'best-practice' manuals on wind energy projects and investments, offered financial consulting services, and made project appraisals for developers.

In response to concerns about wind turbine quality the agency has worked with the Ministry of Non-conventional Energy Sources (MNES) to develop a wind turbine certification programme. One cause of poor performance in wind turbines is improper siting, so IREDA and MNES have prepared guidelines on site planning and selection to help wind project developers.

World Bank/GEF assistance also increased IREDA's ability to develop a renewables sales and service infrastructure for solar PV systems in India. Several years into the project it was clear that the lack of after-sales service and credit-delivery barriers were hindering development of the rural market. In 1998, the project began to test different service delivery models to overcome these barriers. In one model, a rural energy-service enterprise leases PV systems to households for a monthly fee that includes service and maintenance of the system. The enterprises operating under this delivery model are typically local organizations with strong ties to the community; most are already providing some type of service that, with training, has been extended to cover maintenance of PV systems. Other concepts under consideration are to incorporate PV sales into existing rural dealer/service networks, such as that for LPG gas, or to provide consumer loans through existing rural micro-credit organizations.

### **India is Now a Major Factor in the Renewable Energy Business**

More than 1,200 MW of wind power capacity is now on-line in India, representing more than two-thirds of the total wind power capacity in developing countries. Most of this capacity is privately owned, and part of the Government's success in encouraging private sector investment in wind farms can be attributed to IREDA's efforts.<sup>2</sup> By the late 1990s, dozens of domestic wind turbine manufacturers had emerged, many of them joint ventures with foreign partners. Many of these manufacturers featured the latest high-technology turbine designs. Although wind turbine blades are still largely imported, domestic production of blades has begun and export of blades and synchronous generators to Europe is occurring. Installed costs declined from around \$1200/kW in 1991 to \$815-1050/kW in 1998, while equipment certification has reduced risks to project developers. The number of Indian consultants capable of developing wind power investment projects has increased dramatically.

Despite these impressive gains, it remains to be seen whether the market can survive in the absence of the favorable investment tax incentives that prevailed in the 1990s. Many policy analysts have started to advocate stronger production-based incentives as a more effective way to stimulate the market in coming

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<sup>2</sup> <http://mnes.nic.in/frame.htm?majorprog.htm>

years. Continuation of the power wheeling, banking and third-party sales allowed by state utilities will also be important for continued private-sector investment. For example, states such as Andhra Pradesh and Karnataka, which allow commercial third-party sales of mini-hydro power (rather than requiring sales to utilities) lead in commercial mini-hydro development. Other factors will continue to be important as well; the recent decline in wind farm development in Tamil Nadu, for example, has been attributed partly to factors like inadequate capacity of substations, weak distribution connections, poor maintenance, inadequate facilities for repair, rotor blade failures due to manufacturing defects and lightning, and control system failures due to disregard for grounding regulations.<sup>3</sup>

In parallel with wind and small hydro, the solar PV market in India has grown greatly in recent years. The World Bank/GEF project helped increase solar PV capacity from 0.6 MW (6,200 systems) in the early 1990s to 50 MW (675,000 systems) in 2000. India now exports PV modules. Although the impressive growth in the renewables market is not solely the result of the project, that the effort increased the size and capacity of IREDA and helped to catalyze growth in the markets for renewable energy is clear.

## **LESSONS LEARNED**

- Public-private partnerships that link policy changes with private financing to promote renewables markets can work. The combination of government tax incentives, electric power sector policies, acceptance of the technologies by commercial investors, and IREDA support created the right environment for the private sector to invest in renewables;
- Funds and expertise provided by international organizations can help increase the capacity and effectiveness of a developing country intermediary like IREDA;
- Government policies play an important role in technology transfer. Tax incentives helped to stimulate the market and import tariffs on equipment continue to be an important issue.
- Even if private investments occur, long-term experience for working out technical and operational difficulties is still necessary for good technical performance.
- Development and testing of different business models for delivery of solar PV in rural areas are needed to find effective ways to overcome service, credit, and institutional barriers.

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<sup>3</sup> A. Jagadeesh, "Wind Energy Development in Tamil Nadu and Andhra Pradesh, India—Institutional Dynamics and Barriers," *Energy Policy* 28(2000): 157-168.