

**ASIAN DEVELOPMENT BANK**

**PCR: IND 27068**

**PROJECT COMPLETION REPORT**  
**ON THE**  
**RENEWABLE ENERGY DEVELOPMENT PROJECT**  
(Loan No. 1465-IND)  
**IN**  
**INDIA**

**June 2004**

## CURRENCY EQUIVALENTS

Currency Unit – Indian rupee/s (Re/Rs)

		<b>At Appraisal</b>	<b>At Completion</b>
Re1.00	=	\$.03	\$ 0.02
\$1.00	=	Rs35.64	Rs46.61

## ABBREVIATIONS

ADB	—	Asian Development Bank
ALM	—	asset liability management
ARLA	—	amended and restated loan agreement
BDA	—	business development associates
CO <sub>2</sub>	—	carbon dioxide
DFI	—	development finance institution
DSCR	—	debt service coverage ratio
EIRR	—	economic internal rate of return
FIRR	—	financial internal rate of return
ICB	—	international competitive bidding
IEE	—	initial environmental examination
IREDA	—	Indian Renewable Energy Development Agency Limited
LIBOR	—	London interbank offered rate
LBL	—	LIBOR -based loan
MNES	—	Ministry of Non-Conventional Energy
MRM	—	management review meeting
NBFC	—	nonbank finance company
NPA	—	nonperforming asset
NRSE	—	new and renewable sources of energy
PBSCL	—	pool-based single currency loan
PCR	—	project completion report
RBI	—	Reserve Bank of India
RES	—	renewable energy sources
RET	—	renewable energy technology
RRP	—	report and recommendation of the President
SPV	—	solar photovoltaic
SO <sub>2</sub>	—	sulfur dioxide
TA	—	technical assistance

## WEIGHTS AND MEASURES

KWh (kilowatt-hour)	—	1,000 watt-hours
MW (megawatt)	—	1,000 kilowatts

## NOTES

- (i) The fiscal year (FY) of the Government and the Indian Renewable Energy Development Agency ends on 31 March. FY before a calendar year denotes the year in which the fiscal year ends, e.g. FY2005 ends on 31 March 2005.
- (ii) In this report, "\$" refers to US dollars.

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## BASIC DATA

### A. Loan Identification

1.	Country	India
2.	Loan Number	1465-IND
3.	Project Title	Renewable Energy Development Project
4.	Borrower	Indian Renewable Energy Development Agency Limited
5.	Name of Development Finance Institution	Indian Renewable Energy Development Agency Limited
6.	Amount of Loan	\$100 million
7.	Project Completion Report Number	PCR IND: 821

### B. Loan Data

1.	Appraisal	
	– Date Started	21 August 1995
	– Date Completed	4 September 1995
2.	Loan Negotiations	
	– Date Started	26 August 1996
	– Date Completed	28 August 1996
3.	Date of Board Approval	26 September 1996
4.	Date of Loan Agreement	23 April 1997
5.	Date of Loan Effectiveness	
	– In Loan Agreement	22 July 1997
	– Actual	15 July 1997
6.	Terminal Date for Commitments	
	– In Loan Agreement	16 July 2001
	– Actual	16 July 2001
7.	Closing Date	
	– In Loan Agreement	16 July 2002
	– Actual	25 October 2002
8.	Terms of Loan	
	– Interest Rate	\$56,912,330.73 — pool-based single currency (floating) \$43,087,669.27 — LIBOR-based lending facility (floating)
	– Maturity (number of years)	25
	– Grace Period (number of years)	5
	– Free Limit	\$5 million
	– Repayment Terms	Payable in 40 semiannual fixed installments, commencing January 2002

## 9. Disbursements

## a. Dates

<b>Initial Disbursement</b>	<b>Final Disbursement</b>	<b>Time Interval</b>
26 December 1997	25 October 2002	4 years, 10 months
<b>Effective Date</b>	<b>Original Closing Date</b>	<b>Time Interval</b>
15 July 1997	16 July 2002	5 years

## b. Amount (\$ million)

<b>Category</b>	<b>Initial Fund Allocation</b>	<b>Revised Fund Allocation</b>	<b>Actual Disbursement</b>	<b>Undisbursed Balance</b>
Biomethanation	10.00	0.00	0.00	0.00
Bagasse-Based Cogeneration	25.00	60.00	55.34	0.00
Wind Energy	60.00	36.00	40.35	0.00
Solar-Thermal	5.00	4.00	4.09	0.00
Capitalization of Interest	0.00	0.00	0.12	0.00
TA Cost Recovery	0.00	0.00	0.10	0.00
<b>Total</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>0.00</b>

TA = technical assistance.

Source: Asian Development Bank Records.

**C. Implementation Data**

1. Number of Subloans 51
2. Size of Subloans (actual) (\$ million)

<b>Range</b>	<b>Cogeneration</b>		<b>Wind</b>		<b>Solar-Thermal</b>		<b>Number of Subloans</b>	<b>Aggregate Amount</b>
	<b>No.</b>	<b>Amount</b>	<b>No.</b>	<b>Amount</b>	<b>No.</b>	<b>Amount</b>		
Up to \$1 million	1	0.92	2	1.60	21	3.03	24	5.55
\$1 million–3 million	5	10.11	7	17.80	1	1.06	13	28.97
\$3 million–5 million	2	6.67	6	20.95	0	0.00	8	27.62
Over \$5 million	6	37.64	0	0.00	0	0.00	6	37.64
<b>Total</b>	<b>14</b>	<b>55.34</b>	<b>15</b>	<b>40.35</b>	<b>22</b>	<b>4.09</b>	<b>51</b>	<b>99.78</b>

Source: Asian Development Bank Records.

## 3. Subloans Above Free Limit (\$5 million)

Subloan Number	Subborrower Description	Subloan Disbursed (\$ million)	Purpose
A01	Shamanur Sugars Limited	6.87	Cogeneration
A07	Prabhulingeswar Sugar Works Limited	5.80	Cogeneration
A27	Kakatiya Cement And Sugar Industries Limited	6.75	Cogeneration
A44	Arunachalam Sugars Limited	5.10	Cogeneration
A52	Sagar Sugar & Allied Products	5.53	Cogeneration
A60	Supreme Renewable Energy Limited	7.59	Cogeneration
	<b>Total</b>	<b>37.64</b>	

Source: Asian Development Bank Records.

## 4. Project Performance Report Ratings

Implementation Period	Ratings	
	Development Objectives	Implementation Progress
1 January 1998 to 31 December 1998	S	S
1 January 1999 to 31 December 1999	U	U
1 January 2000 to 31 December 2000	S	S
1 January 2001 to 31 December 2001	S	S
1 January 2002 to 31 December 2002	S	S

S = satisfactory, U = unsatisfactory.

Source: Asian Development Bank Records.

## D. Data on Asian Development Bank Missions

Name of Mission	Date	No. Of Persons	No. Of Person-Days	Specialization of Members <sup>a</sup>
Fact-Finding	20 May–3 June 1995	3	42	a, b, j
Appraisal	21 Aug–4 Sep 1995	7	98	a, b, c, e, f, g, h
Inception	6 – 8 Aug 1997	4	8	a, b, d, i
Review	13–16 Sep 1999	3	9	a, g(2)
Review	27 Dec 2000–5 Jan 2001	2	18	g, j
Review	18 Sep–12 Oct 2001	2	48	g, j
Review	9–24 Oct 2002	1	15	j
PCR Review	9–11 Feb 2004	3	9	a, b, j

<sup>a</sup> a-engineer, b-financial analyst, c-counsel, d-control officer, e-programs officer, f-president representative, g-representative India Resident Mission, h-manager, i-environmental specialist, j- project implementation officer.

<sup>b</sup> The project completion report was prepared by Mythili Ravi, Financial Officer with assistance from ICRA Limited, Consultants Deepti Singhal, Assistant Financial Analyst, India Resident Mission.

Source: Asian Development Bank Records.

## I. BACKGROUND

### A. History

1. Indian Renewable Energy Development Agency Limited (IREDA) was incorporated in March 1987, under the Companies Act, 1956, as a specialized financial institution, wholly owned by the Government, primarily for promoting, developing, and financing new and renewable sources of energy (NRSE) technologies [Detailed information on IREDA appears in paras. 69–83 of the report and recommendations of the President (RRP)<sup>1</sup>]. IREDA's main objectives are to (i) operate a revolving fund for promotion, development, and commercialization of NRSE; (ii) assist in upgrading NRSE technologies; and (iii) extend financial support to energy efficiency and energy conservation projects. IREDA pursues its objectives through: (i) promotional programs that include organizing and financing entrepreneurial development, training, and workshops and information campaigns that promote renewable energy sources (RES) technologies for prospective and existing clients; and (ii) financing RES system producers, manufacturers, and users. IREDA's assists projects based on RES, illustratively, solar energy, wind energy, biomass energy, biomethanation systems, small hydro sources and so on; and energy conservation systems.

### B. Scope of Operations

2. IREDA, operating under the Ministry of Non-Conventional Energy Sources (MNES), provides long-term rupee funds to develop and promote commercially viable RES technologies in the country by (i) extending financial support to manufacturers and users of RES technology systems; (ii) financing entrepreneurs that undertake RES development; and (iii) assisting in rapid commercialization of RES technologies. IREDA also provides advisory and consultant assistance in choosing technology, installing proven systems, demonstrating new systems and performing field trials, supporting technology development and manufacturing, and extending maintenance services.

### C. Relationship with the Asian Development Bank and Other Lenders

3. The Project was the Asian Development Bank's (ADB's) first 25-year loan of \$100 million to IREDA. Multilateral and bilateral organizations—such as Danish International Development Assistance, Global Environment Facility, Kreditanstalt für Wiederaufbau of Germany, Swiss Development Cooperation, and World Bank—also provided grants and loans to IREDA. International grants and loans were extended to IREDA to onlend to the private sector for (i) investment in the generation of power through RES; and (ii) energy efficiency promotion; demand-side management investments; and market barrier removal for energy efficiency services and products delivery. A small part of this assistance was also put toward IREDA's institutional development.

4. Since IREDA was sponsored by the Government, to carry out development objectives, it had access to equity support, besides tax-free bonds, from the Government. However, during recent years, the Government's equity support and allocations for issuing tax-free bonds was reduced, due to IREDA's evolving into a self-sustaining institution and the Government's conscious policy of reducing budgetary allocations to publicly owned financial institutions.

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<sup>1</sup> ADB. 1996. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grant to the Indian Renewable Energy Development Agency Limited for the Renewable Energy Development Project*. Manila.



Consequently, IREDA's reliance on international aid agency funds and local currency borrowing from commercial banks has steadily increased.

#### **D. Relevance of Design and Formulation**

5. Power shortages and poor supply quality were some of the most serious infrastructure constraints to sustainable economic growth and foreign investment. To meet growth and investment demands, extensive investments are required in power projects. Because of the competing demands of other sectors of the economy on limited resources, the country was unable to undertake such large-scale investments, and shortages persist. Power systems based on RES are suitable for alleviating some power shortages, while also being environment friendly. Therefore, part of the Government's policy for expanding energy supply is to promote the RES development and encourage private investments in this sector. Beginning from the establishment of the Commission for Additional Sources of Energy in early 1981, the Government consistently paid increasing attention to planning and promoting renewable energy technology (RET) projects, which culminated in establishing an independent ministry for the purpose. Successive 5-year government plans increased the target for energy production from RES. The Eighth Five-Year Plan (FY1993–FY1997) aimed at installing 1,000 megawatts (MW), which increased to 3,075 MW in the Tenth Five-Year Plan (FY2003–FY2007). Further, central and provincial-level governments offer a number of incentives, including interest rate subsidies, accelerated depreciation that allows tax savings, customs and/or excise duty exemption, and capital subsidy, apart from providing the necessary regulatory framework and enabling conditions to facilitate the sale, wheeling, and banking of power.

6. ADB's strategy in India involves supporting major policy reforms undertaken in the power sector, including an increased private sector role. Additionally, ADB's policy regarding assistance to the Indian energy sector was focused on resource conservation, environmental improvement, and institutional development. Its lending strategy continues to support investments through efficient public utilities and the private sector. The Project's primary rationale of expanding energy supply through private sector RES investments fit well into ADB's overall power sector strategy. Accordingly, the RRP (footnote1) defined project objectives as: (i) promote commercialization of RES technologies by strengthening IREDA's capacity to promote and finance entrepreneurial investments in alternate energy; (ii) encourage private sector investments in small-scale power generation using RES technologies; (iii) expand marketing and financing mechanisms for the sale and delivery of alternate energy systems, based on full cost-recovery principles; and (iv) promote environmentally sound investments, to prevent depletion of India's limited forest resources and reduce the energy sector's dependence on fossil fuels. IREDA, with its mandate to implement the country's policies and programs in the RES sector, was the appropriate Executing Agency. The project design was based on project preparatory technical assistance (TA)<sup>2</sup> findings on credit demand from RET projects. To accord sufficient flexibility, based on changes in market conditions, the design appropriately provided for change in allocations.

#### **E. Related Technical Assistance**

7. The Project included advisory TA (footnote 1) for IREDA's institutional development and capacity building. The TA was completed in July 2001. The TA is expected to enhance IREDA's capacities and complement the programs for enhanced commercial orientation initiated by other aid agencies, such as Global Environment Facility, Swiss Development Cooperation, and

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<sup>2</sup> ADB. 1993. *Technical Assistance to India for Renewable Energy Development Project*. Manila.

World Bank. The scope of ADB's TA initially included assistance to strengthen IREDA's capabilities in credit analysis and risk management; financial management; loan portfolio management; foreign exchange risk management; environmental, social, and economic impact assessment; and economic analysis of projects. Considering an ongoing World Bank-financed TA, the scope was subsequently reduced, in consultation with IREDA, to include technical, environmental, and institutional aspects, at a reduced budget of \$300,000. The TA completion report<sup>3</sup> rated the TA as satisfactory.

## II. IMPLEMENTATION

### A. Lending Policies

8. IREDA's lending policies are guided by the objective of promoting the Government's RES sector priorities, while also ensuring its own long-term sustainability and assisted project's commercial viability. IREDA's yearly memorandum of understanding with MNES requires it to earn positive returns, in real terms, on its paid capital and reserves, while observing financial prudence. IREDA also agreed with international aid agencies and lenders to comply with specific financial ratios.<sup>4</sup> When appraising projects, IREDA follows established norms for evaluating technical feasibility, economic and financial viability, and country environmental standards conformity. In addition, where projects are assisted by IREDA, using funds received from multilateral and bilateral agencies, the procedures include adherence to norms related to procurement procedures and environmental and social safeguard guidelines.

9. IREDA's lending norms and procedures have evolved over recent years, in response to increased competition in financial markets. IREDA revises its interest rates periodically, to reflect changing market conditions and its cost of funds. To encourage private sector investment in renewable energy, IREDA normally finances up to 70–75% of total project cost, going up to 85% in specified subsectors. Repayment periods range from 8–12 years, depending on a project's subsector, with an initial moratorium of 1–3 years. IREDA's terms and conditions of assistance for each subsector are dependent upon a subsector's commercial viability and the Government's priorities. IREDA does not vary interest rates for different projects in the same subsector, in accordance with their relative risk levels. IREDA relies on government authorities, who regulate and supervise these projects, to determine each subproject's conformity to national and provincial laws and regulations related to environmental and social safeguard aspects. For the subprojects funded under the Project, IREDA also obtained initial environment examination (IEE) reports from the sponsors, wherever considered necessary.<sup>5</sup> However, for wind energy projects, IREDA determined that no adverse environmental impacts existed, and therefore no IEE was submitted.

### B. Characteristics of Subloans

10. The Project's main objective was to promote RES technologies commercialization in India. Based on technical, financial, and economic evaluations and a capital requirements analysis, (footnote 2) the Project was designed to support the RET investment financing in industry, with a focus on (i) biomethanation for energy production (\$10 million); (ii) bagasse-

<sup>3</sup> ADB. 2004. *Technical Assistance Completion Report on Institutional Strengthening of Indian Renewable Energy Development Agency, Limited (India)*. Manila.

<sup>4</sup> To illustrate, these include a maximum debt-equity ratio of 4:1 and debt service coverage of not lower than 1.5 in ADB's case.

<sup>5</sup> Solar-thermal units installed in users' premises did not involve adverse environmental impacts. That being the case, IEE was not required.

based cogeneration (\$25 million); (iii) wind power (\$60 million); and (iv) solar-thermal systems (\$5 million). Due to recessionary conditions in industry and certain changes in tax policies, no demand existed from the biomethanation subsector, while the wind subsector experienced reduced interest. Hence, at IREDA's request, ADB reallocated the loan, with \$60 million for bagasse-based cogeneration, \$36 million for wind generation, and \$4 million for solar-thermal systems. The loan's final use was largely consistent with the revised allocation, although with a \$4 million excess under the wind subsector and a corresponding shortfall under sugar cogeneration. Against the targeted 125 MW of power generation capacity from the Project, the subprojects, using their own equity, besides ADB's and other lenders' funds, have installed generating capacity of 318 MW. The Project funded 51 subprojects: 6 for \$38 million above free limit<sup>6</sup> and 45 for \$62 million below free limit. Of these, 14, for \$55 million, were cogeneration plants; 15, for \$40 million, were wind power projects; and 22, for \$4 million, were solar-thermal plants (Appendix 1, Table A1.1). Against an estimated potential of 3,500 MW of bagasse-based capacity in the country, IREDA has financed the establishment of 447 MW of capacity, of which 267 MW of capacity were set up by 14 subprojects assisted under the Project. In wind generation, against an estimated potential of 45,195 MW of capacity in the country, IREDA assisted the installation of 621 MW of capacity, of which ADB loan proceeds financed an installed capacity of 51 MW, undertaken by 15 subprojects<sup>7</sup> (Appendix 1, Table A1.2). The Project assisted the installation of solar-thermal units for 7,659 users, resulting in annual energy savings of 10,753 metric tons of coal replacement.

11. All 15 wind subprojects and 14 cogeneration subprojects were commissioned. Most wind farms were established in the state of Maharashtra, followed by Karnataka, Madhya Pradesh, and Tamil Nadu, in that order. This distribution generally reflects the potential for wind energy in the country, which is largely concentrated in Andhra Pradesh, Gujarat, Karnataka, Maharashtra, and Tamil Nadu. Over the last decade, rapid growth occurred in the installed capacity of wind energy projects, and 80% indigenization in the manufacture of wind electric generators occurred. The cogeneration subprojects are equally distributed over three states: Andhra Pradesh, Karnataka, and Tamil Nadu, which are all sugarcane-rich states. A feature of solar-thermal units is their relatively small size, similar to a consumer-durable equipment, requiring very small investments for domestic-level use. Given the need for their installation at decentralized levels in homes, hotels, hostels, and so on, IREDA chose to channel assistance through product manufacturers, financial intermediaries, and development agencies. IREDA channeled about \$3 million to 19 subprojects through such intermediaries. This route for channeling assistance facilitated IREDA's outreach; but the capacity of manufacturers was restricted by their ability to book borrowings in their balance sheet, since they were also functioning like a financial intermediary, requiring capital allocation for the purpose. Solar thermal subprojects occurred mainly in Karnataka and Maharashtra, which are homes to many manufacturers and have the potential for tapping solar heat (Appendix 1, Table A1.3).

12. Project funds' distribution across states reflects the overall distribution of IREDA assistance, with more than 80% of its disbursements channeled to Andhra Pradesh, Karnataka, Maharashtra, and Tamil Nadu. These states are also more industrially advanced. Subproject size (based on project cost) ranged from \$60,502 to \$27 million. Average project size for solar-thermal, wind and cogeneration sectors was \$224,903, \$4 million, and \$11 million, respectively. Average loan sizes were \$185,987, \$3 million, and \$4 million, for the solar-thermal, wind energy, and cogeneration sectors, respectively. The share of small-sized subprojects in all

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<sup>6</sup> \$5 million.

<sup>7</sup> Source: *MNES Annual Report* and IREDA.

subsectors were relatively high – 8 cogeneration subprojects, costing \$62 million, and ADB assistance of \$21 million; 8 wind generation subprojects, costing \$24 million, and ADB assistance of \$19 million; and 14 solar thermal subprojects, costing \$2 million, and ADB assistance of around \$2 million, – were less than the respective average project size. ADB's assistance accounted for 47% of overall project cost, with sponsors' contributions of 26% and contributions from IREDA and other lenders at 27%. The Project resulted in catalysis of investments of \$213 million, reflecting a leverage of 2.13 (Appendix 1, Table A1.4).

## **C. Implementation and Internal Operation of Subprojects**

### **1. Implementation of the Project**

13. The initial pace of the Project was very slow, with only \$25 million withdrawn until 1999. ADB, in consultation with IREDA, identified impediments to loan use. Although the RRP required IREDA to follow ADB's *Guidelines for Procurement* for development finance institutions (DFIs), during the initial period (up to October 1999), IREDA had subproject sponsors follow international competitive bidding (ICB) procedures and sent various related documents to ADB for review, even though the subprojects were below free limit and relevant individual contract values were below the threshold for ICB procedures adoption. Review of bidding documents, initially by IREDA and thereafter by ADB, caused time constraints for the subproject sponsors, and they were discouraged from availing of the Project funds whenever other options were available. In response to IREDA's request, and to reduce approval time, ADB permitted IREDA to adopt procurement procedures, as applicable under DFIs, since IREDA performed functions similar to DFIs. Another restrictive factor was the subsector allocation, which was suitably altered, based on changed market conditions (para. 10).

14. Given the low cost of solar-thermal units and limited outreach of IREDA ADB recognized during implementation, that channeling the facility through retail financing was necessary. ADB concurred with IREDA's intention to finance end users of solar-thermal equipment through intermediaries. In line with the Government's policy to encourage the solar-thermal sector, ADB agreed to a lower promoters' contribution, of 15%, from the stipulated 25%. In the wind sector, investors were often deterred by the need to deal with various formalities, such as obtaining permission from utilities; purchasing land; micro-siting and grid interphasing, which are prerequisites to establishing a wind farm. ADB approved financing project developers who provide these services to investors, who are then relieved of such responsibilities.

15. Such flexibility from ADB to the ground realities enabled easier project implementation, and the loan was fully committed by the end of 2001. Although the entire expenditure financed by ADB was incurred before the loan closing date, actual reimbursement by ADB was delayed until IREDA submitted the withdrawal applications, after the effectiveness of the LIBOR -based loan (LBL) facility, which is more competitive than the pool-based single currency loan (PBSCL) hitherto availed of by IREDA. The last chunk of \$43 million was disbursed under the LBL facility during July–October 2002, 3 months after the initial closing date (Appendix 2).

### **2. Internal Operations of the Subprojects**

16. All 51 subprojects financed under the Project were commissioned by the end of 2003, with 19 subprojects commissioned with time overruns ranging from 2 to 39 months. Time overruns were mainly due to delayed statutory approvals and clearances; delayed land acquisition; natural calamities; delayed signing of power purchase agreements with state utilities; and delayed procurement of machinery and equipment and lack of procurement

experience. Delayed commissioning and insufficient budgeting for plant and machinery costs primarily led to cost overruns for nine subprojects, ranging from 4% to 25% of the originally approved costs. Cost overruns were financed by internal generation or loans from sources other than IREDA, except in three cases, where increased cost was financed partially by additional loans from IREDA. Two subprojects completed the project at a cost less than the original estimate, due to a subsequent reduction in plant and machinery costs and a decrease in the margin money for bank guarantee. Subloans were secured by fixed assets of the subprojects.

17. The financial internal rates of return (FIRR) and economic internal rates of return (EIRR) for 22 subprojects were estimated to range between 14% and 31% and between 12% and 39%, respectively (Appendix 1, Table A1.2). The revised FIRRs and EIRRs calculated for eight subprojects ranged from 10% to 22% and 8% to 22%, respectively, which was almost always below projected FIRRs and EIRRs. While the initially calculated FIRRs of subprojects were above the cost of borrowings from IREDA, in many cases, partly due to lower actual revenues and a reduction in domestic interest rates, IREDA restructured some of its subloans at reduced interest rates. Revised cogeneration project FIRRs were less than EIRRs, while revised wind project FIRRs were more than EIRRs (Appendix 3). Perhaps this trend reflects relatively higher subsidies for wind projects vis-à-vis cogeneration projects. Further, EIRRs include some environmental benefits quantified and included as revenues. Cogeneration projects have relatively lower capital costs and higher capacity-use factors (as opposed to wind projects), which lead to higher EIRRs. Other socioeconomic benefits, such as increased land prices and employee incomes, were not considered in EIRR calculations.

18. IREDA's lending is denominated in Indian rupees, since lending in foreign currency would entail additional credit risks, arising from foreign currency fluctuations. To hedge the foreign currency fluctuation risks of ADB's loan, IREDA entered into an agreement with domestic commercial banks, by equivalent borrowings from them against the deposit of foreign currency withdrawn from ADB. Due to limited domestic swap markets and shallow debt markets, IREDA was constrained in hedging foreign currency in the market and instead had to enter into a bilateral deal. This deal restricted IREDA's ability to unwind from the fixed interest transaction that proved rather expensive in a changed situation, which was marked by a rapid reduction in domestic interest rates.

### **3. Project Benefits**

19. The Project supported a power generation capacity of 318 MW, through RES technologies, apart from impacting positively the social and economic environments of subproject locations. The Project supported direct and indirect employment generation for 1,179 people (Appendix 1, Table A1.5) and increased access and improved quality of electricity for local residents; industries; and farmers, which aided irrigation through use of pump sets. The subprojects, dispersed in various locations, formed a marginal part of the power supply in their respective locations, and for that reason their impact cannot be isolated from the prevailing setup. However, spin-off effects were noticed during site visits. These were: start-up economic activities, such as cane transportation, lignite storage activities, industrial security services, tea stalls, and vehicle maintenance and repair unit and/or shops. Direct and indirect employment for semiskilled and unskilled people resulted in quality of life improvements for employees and their families. Discussions with managers and employees of selected subprojects indicated increase in average household monthly income from Rs1,000 to Rs7,000. Development of access roads to the subprojects led to improved connectivity for villages with town and/or district headquarters. Local villagers can also access medical facilities established for subproject

employees. Some large wind farm developers built schools,<sup>8</sup> to be maintained by local administrations.

20. The Project assisted in substituting coal with RES, reducing adverse environmental impact normally associated with power generation using fossil fuels (Appendix 1, Table A1.5). The direct beneficial impact due to reduced greenhouse gases is estimated to be an annual reduction of 6 million kilograms of SO<sub>2</sub> and 705 million kilograms of CO<sub>2</sub> emissions. Disposal problems associated with 194 million kilograms of fly ash and slag per year were estimated to have been mitigated. Visits to select project sites by the Project Completion Report (PCR) and Review Missions<sup>9</sup> revealed that the cogeneration subprojects generally put in place facilities for environmental safeguards, installed pollution control equipment at respective sites, and did not report negative impacts on the surrounding environment. Some subprojects also engaged consultants to implement an environment management plan. During the site visits the PCR Mission also noted that wind farms were located on barren land, in remote areas away from habitation. Hence, no adverse environmental (such as noise pollution and flora and fauna damage) or social impacts were reported. The Project did not envisage any adverse social impacts or human resettlement [detailed information on social impacts appears in para 104 of RRP (footnote 1)]. Hence, no specific covenants related to these were in the Loan Agreement.

#### **D. Operational Performance of Indian Renewable Energy Development Agency Limited**

##### **1. Organization, Management, and Staffing**

21. IREDA is managed by a government appointed Board of Directors, of which two members are government officials; three are full-time functional directors; and the rest are independent directors with experience in professional areas, such as finance, industry, and academia. By an amendment to its articles of association, dated 20 September 2002, the post of chairperson (hitherto ex officio secretary, MNES) was combined with that of managing director. As of 31 March 2003, the Board comprised one chairperson (secretary, MNES); three functional directors, including one managing director; one government official; and six independent directors. Every year, IREDA enters into a memorandum of understanding with MNES, which defines approvals and disbursements targets, financial covenants fulfillment, portfolio quality improvement, and other performance parameters.

22. IREDA is registered as a nonbank finance company (NBFC) with the Reserve Bank of India (RBI), the country's central bank. NBFCs and banks in India are usually regulated and supervised by RBI, for compliance with prudential regulations (on asset classification, income recognition, and funds provisioning); asset liability management (ALM); deposit taking; and related maintenance of statutory liquidity ratios and risk management. IREDA, being a government-owned company, is subject to limited RBI regulation and supervision, but its annual accounts are audited by the statutory auditors appointed under the directive of the controller and auditor general of India, who is also empowered to conduct an additional audit.

23. IREDA's decision-making processes are relatively centralized within its Board of Directors and the Committee of Directors, although limited powers are granted to functional directors. IREDA's Committee of Directors has substantial lending powers, while the Board's

<sup>8</sup> Enercon Winds Farms (India) Ltd., in Chitradurga (Karnataka) district.

<sup>9</sup> Staff consultants appointed by ADB for assistance in preparation of the project completion report visited 10 subproject sites (Appendix 6). Photographs of the sites selected during these missions appear in Appendix 7.

seven-member Audit Committee, which was formed in April 2001, reviews internal and external audit reports. IREDA's operations are centralized at its Delhi headquarters. IREDA is organized in terms of functional areas, each headed by a general manager, under the direct supervision of two full-time directors. For internal audits, IREDA appoints an external auditor.

24. With a loan portfolio of Rs21 billion (\$452 million equivalent), covering 600 accounts, and employee strength of 135 people [engineers (40), accounting and financial experts (14) and legal experts (8)], IREDA's organizational structure so far meets its operational requirements. IREDA's recent performance and future plans for substantially increased annual lending call for strengthening its capacities in certain areas. Increased competition in the financial sector resulted in reduced margins on loans and provoked cost-cutting measures by competing lenders. IREDA, which hitherto could act as a development institution, must adopt measures to reformulate its operational processes and procedures, revamp and strengthen its management, adopt modern commercially oriented banking practices, and equip itself with suitable qualified staff members to face competition. IREDA's organizational structure and processes, which were reasonably adequate to undertake appraisal and evaluation of the technical aspects of RET projects, need to be strengthened in terms of systems and processes designed to address credit risks, monitor asset portfolios, and manage market risks associated with lending activities.

## **2. Personnel Administration**

25. For human resource development, IREDA regularly nominates its officials to professional training courses and seminars, workshops, and symposia on specialized subjects, within and outside the country, to keep them abreast of the latest developments in their respective fields. IREDA's capacity can be enhanced by inducing professionals in the field of risk management, treasury operations, and ALM. IREDA's compensation structure for its staff is linked to those of the public sector and limits its ability to attract and retain high-quality staff members. The advisory TA attached to this loan, (fooonote 1) for institutional development and capacity building, is aimed at meeting some of these needs. In addition, TA prepared under the World Bank's second line of credit is under implementation.

## **3. Lending Operations**

26. IREDA's subproject appraisal is guided by its Operational Policy Statement, which describes its operating philosophy and rationale, objectives, programs, procedures, and policies that guide its relations with its clients and its own operational and financial activities. IREDA's loan appraisal processes and procedures have evolved, with changes in its role, as bestowed upon it by the Government. During the initial years of its operation, IREDA was essentially engaged in carrying out the Government's agenda of disseminating and promoting RETs, mainly through demonstration projects and research and development efforts. Since the mid-1990s, the emphasis shifted to the commercialization of RET projects through fiscal incentives and financial assistance based on commercial viability. As IREDA's role thus evolved into a financial intermediary for channeling private capital, its internal processes and procedures also changed. Since the mid-1990s, IREDA adopted project appraisal procedures to appraise the financial and commercial viability of projects. Although IREDA implemented a number of progressive measures, experience under this loan reveals a need for further strengthening of IREDA's internal processes for project appraisal and monitoring and portfolio risk management.

27. IREDA endeavors to approve qualified financing proposals, normally within 3 months from application receipt, but loan signing and effectiveness, which require fulfillment of certain conditions, often take several months. To reach out to remote areas and promote microlending

operations, IREDA networks with business development associates (BDAs) and financial intermediaries, with the intention of business generation; creating infrastructure; and providing financial support to BDAs. With growth in its operations, IREDA progressively took steps to introduce closer monitoring of its assisted projects, which included visits to project sites; appointment of nominee directors on the boards of assisted companies; and appointment of concurrent auditors and engineers to monitor subproject implementation and performance. At periodic intervals, a special review committee reviews IREDA's portfolio. With the help of external consultants, IREDA reviews project benefits. The Project enabled IREDA to introduce global norms on procurement in its assisted projects. IREDA improved its portfolio management efforts in recent times, to contain the level of nonperforming loans.

#### **4. Other Operations**

28. IREDA implements the Government's policy of energy conservation and renewable energy generation through other nonfund activities, such as (i) creating public awareness through media events, seminars, demonstration facilities, field trips, and study tours; (ii) distributing promotional materials to institutions, organizations, and enterprises and research institutions, nongovernment organizations, academic institutions, and private citizens; (iii) advocating, with the Central Government and state governments, the formulation of an appropriate policy framework for attracting investment in this subsector; and (iv) implementing direct projects and programs of MNES.

#### **E. Indian Renewable Energy Development Agency Limited's Financial Performance**

29. During the initial years of its operation, IREDA's activities were essentially promotional. In subsequent years, as RET matured and offered greater potential for commercialization, IREDA's operations experienced significant growth in assistance to commercially viable investments by private sponsors. IREDA's yearly approvals and disbursements recorded an annual growth of 66% and 56%, respectively, during the 1990s and 16% and 25%, respectively, during the 7-year period since ADB's 1995 loan approval until 2002 (Appendix 4, Table A4.1). The robust growth in the mid-1990s was a result of maturing RETs, government support to privately sponsored projects, and overall industry and economy growth. This trend in growth, however, reversed during FY2000–FY2003, with a fall of 12% and 7%, respectively, in approvals and disbursements over the previous year—mainly a result of reduction in good RET projects, due to consolidation in industry, following rapid growth earlier. Moreover, changes in the financial sector and RET's maturing led to competition from other financial intermediaries.

30. As IREDA's operations recorded rapid growth, its portfolio of gross nonperforming assets (NPAs) increased from a level of less than 5% prior to FY1996 to 22% in FY1998. IREDA also experienced a poor collection ratio in the late 1990s. The ratio declined from 98% in FY1995 to 74% in FY2002. The high incidence of NPAs and falling collection ratios were due to (i) adverse project selection that often is a part of rapid growth, (ii) insufficient capacity within IREDA to deal with such exponential growth, and (iii) recession seeds that are usually sown during an economic boom and government policies that unwittingly attracted nonserious investors along with serious investors. With experience and the introduction of improved appraisal and monitoring techniques, the increasing trend in NPAs was reversed, with progressive reductions in gross NPA ratios, from 18% in FY1999 to 12% in FY2003. IREDA's cumulative loan loss provisions increased from Rs270 million in FY1999 to Rs820 million in FY2003, providing coverage of 31% of gross NPAs (Appendix 4, Table A4.2).



31. According to IREDA, the high incidence of NPAs among wind energy projects established in the mid-1990s was due to recessionary trends in industry; investor tendencies related to establishing projects for depreciation benefits, without regard to viability; and frequent changes in stated policies on wheeling charges, power tariffs, and third-party sales. With the changed trend toward developer projects on a stand-alone basis, better micro-siting techniques, and better technology, the wind energy sector reached a certain level of maturity, and relatively lower defaults of wind subprojects under the Project bear testimony to this. Based on the recommendations of external consultants appointed with the support of multilateral lenders, IREDA implemented various steps, such as close monitoring of stressed assets, strengthened security measures, recovery cell establishment, selective appointment of concurrent engineers and auditors, and improved appraisal procedures. Other steps for speedy resolution of NPAs included legal action, one-time settlement, and loans restructuring. While these measures showed some results, further capacity building is needed, such as introducing risk management techniques for credit risk evaluation and management.

## **F. Financial Statements and Ratios**

32. Consistent growth in IREDA's operations is reflected in the growth of its loan portfolio, from over Rs5.9 billion in FY1997 to over Rs21.0 billion in FY2003, an average annual growth rate of 23%. Focused only on the RES sector, its assets essentially comprise loans to projects aimed at the generation of energy from RES and assistance to manufacturers of RET equipment. IREDA also recently began funding energy efficiency projects, under a World Bank line of credit. IREDA's assistance takes the form of term loans, which constitute 91% of assets. The annual increase in the loan portfolio varied between 9% and 38% during FY1998–FY2003, with the growth rate showing an increasing trend until FY2001 and declining thereafter. Reduced approvals and disbursements since FY2001 are because: (i) demand from industry reduced; (ii) competition from other lenders increased; and (iii) IREDA lost the advantage it had over other lenders during the previous era of directed lending to the sector (Appendix 4, Table A4.3).

33. The operations increase was accompanied by a corresponding increase in interest income and interest expense, which form more than 85% and 70%, respectively, of all income and expenses (Appendix 4, Table A4.4). IREDA's earnings spread was consistently declining, but the redeeming aspect is the containment of its intermediation cost, which declined from less than 0.52% in FY1999 to 0.35% in FY2003. Although IREDA always earned positive returns on its assets and equity, these declined considerably in FY1999, from 1.93% and 7.88%, respectively, to 0.19% and 0.96% in FY2002. The main reasons for the decline were decreased margins, increased NPA provisioning and writing off, and higher tax charges. Returns increased in FY2003, due to lower provisioning and creation of deferred tax assets.

34. Shareholders' funds, which contributed 28% of total resources in FY1999, gradually declined to 16% in FY2003. Correspondingly, borrowings increased from 66% in FY1999 to 73% in FY2003. Composition of IREDA's borrowings underwent considerable change, with the share of tax-free bonds and government loans declining from 75% in FY2000 to 8% in FY2003, indicative of IREDA's maturing as a financial institution and deliberate limits on government support, due to fiscal limitations. Before FY1999, IREDA did not borrow from banks. However, by FY2002, 30% of all funds borrowed came from banks (Appendix 4, Table A4.5). IREDA's debt-equity ratio increased from 2.50 in FY1999 to 3.53 in FY2003. Worsening debt-equity ratio was contained by equity infusion. The capital adequacy ratio was above the regulatory minimum, and the debt service coverage ratio (DSCR) was consistently within the limits set by ADB under the loan except in FY2002 (Appendix 4, Table A4.6).

## **G. Covenants**

35. IREDA generally complied with most loan covenants (Appendix 5). However, a delay occurred in compliance of a covenant requiring the appointment of directors representing financial institutions and the private sector, an action under government control. IREDA's DSCR was marginally breached during FY2002. At 1.43, the DSCR was short of the covenanted 1.50, but it improved in FY2003.

36. The RRP (footnote 1) recognized that the RET projects are environment friendly but required that safeguards be put in place to mitigate any adverse environmental impacts during construction (detailed information on environmental impacts appears in para 103 and 104 of the RRP). IREDA complied with the requirement<sup>10</sup> to obtain an IEE report on many larger subprojects and ensured that such subprojects met all local and national environmental and safety standards and obtained required clearances from government authorities. IREDA was required to put in place an internal mechanism to monitor environmental compliance by the subborrowers. IREDA, however, does not have sufficient capacity to make a detailed assessment of projects' environmental impacts and hence relies on the due diligence of government authorities, as per the national and state regulations and rules, by making national and state regulations and rules preconditions to assistance.

## **H. Performance of the Asian Development Bank**

37. The Project was the first ADB intervention in the Indian renewable energy sector. Initially, project administration was slow, due to various implementation problems, such as subsidized domestic funds availability, resulting in nonuse of the imprest advance of \$15 million; biomethanation and wind sectors' lack of demand; procurement procedures that were too detailed for small-scale entrepreneurs; long subproject approval period, due to dual approval (initially by IREDA and later by ADB); and other problems. An ADB review mission assessed these implementation problems and allowed certain timely changes to disbursement and procurement procedures. Delegating the loan to the India Resident Mission also helped ADB's timely responses that aided implementation. Constant interaction between ADB and IREDA, through review missions, tripartite meetings, and regular bilateral meetings, facilitated identification and resolution of various problems, thereby ensuring smooth implementation. Some noteworthy actions resulted in the revised allocation of loan financing to various sectors, in response to slow progress in biomethanation and wind sectors (para. 10), and lowered promoters' contribution to 15%, from the stipulated 25%, for solar-thermal systems (para. 14). A random audit of procurement and financial procedures was undertaken, and this audit highlighted IREDA's compliance with international shopping procedures for items with costs equivalent to \$5 million or less but more than \$0.2 million, despite ADB's relaxation of procurement procedures enabling IREDA to adopt procurement procedures applicable to DFIs. The audit also determined that IREDA was in compliance with disbursement procedures.

38. During the subproject approval process, ADB reviewed the IEE submitted by IREDA. Project implementation review missions visited sample subprojects and noted that the subproject companies obtained the required approvals from the statutory authorities for project implementation and commencement and continued operations. During the review missions,

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<sup>10</sup> ADB. 1997. *Loan Agreement between Asian Development Bank and Indian Renewable Energy Development Agency Limited*. Manila. Paras 2(d), 3, 4, 5, 6 and 7 of Schedule 4.

ADB impressed upon IREDA the need to strengthen its monitoring system and procedures to track continued subproject compliance with the safeguard requirements. Overall, ADB's performance was satisfactory.

### **III. EVALUATION**

#### **A. Loan Appraisal**

##### **1. Distribution of Subloans**

39. The Project's primary objective was to expand the country's energy supply through developing RES technologies, encouraging private investment in this sector, and stimulating the creation of a wider market base for RES among industrial and residential energy users by providing a competitive financing mechanism with technical service support. The rationale for selection of specific RES technologies rests on their cost-effectiveness and on market assessments. While determining the four RES technology options with the estimated potential for demand, ADB recognized the need for flexibility in adjusting the allocations based on actual demand, which proved useful during implementation. ADB also demonstrated flexibility in responding to market place changes and reallocated loan funds into areas that exhibited demand (para. 10). The loan's final use was largely consistent with the midterm revision in loan allocation. Actual use also mirrors trends in the share of IREDA's assistance to various RES technologies. The loan was approved at a time when the Government's thrust in promoting RES technologies changed from direct investment to leveraging budgetary resources to attract private investment. In line with the growing maturity in commercially viable technologies in the wind and cogeneration sectors and provision of fiscal support from central and provincial governments, the market responded with investments in areas that were more amenable to commercial viability. ADB's response to such changes in the market trends was in consonance with project objectives.

##### **2. Covenants**

40. In general, the covenants prescribed under the Project were reasonable, and the general adherence to them by IREDA strengthened the Project. However, some performance yardsticks specified by different development partners should still be harmonized. The covenant regarding the need to hedge foreign currency resources against adverse exchange rate fluctuations was necessary. Although, in actual application, ADB could have suitably advised IREDA to adopt global practices and documentation in striking swap deals. Had this occurred, it would have assisted IREDA in adoption of standard swap documents that provide an opportunity to unwind from the swap agreement which proved rather expensive when domestic interests rates fell substantially, due to developments in Indian financial markets during project implementation.

##### **3. Quality of Appraisal**

41. ADB's appraisal of the general economic environment, sector developments, and policy aspects was quite adequate and appropriate and reflected the prevailing environment in the country. The premise that the Project would support the Government's intent to shift from outright grants for government-sponsored system installation and production to the provision of concessional loans for RES development was vindicated by implementation experience. Since project appraisal, considerable growth occurred in IREDA's assistance to projects in the identified RES technologies. The appraisal also correctly identified the need to strengthen IREDA's institutional capacity for gearing itself to appraisal of privately sponsored subprojects.

## **B. Implementation**

42. The Project was the first loan from ADB to IREDA and therefore entailed a steep initial learning curve in the project cycle. Initial delays in implementation were due to the time required for IREDA to understand ADB's procurement and withdrawal procedures, change in the market scenario from what was envisaged during appraisal, and other factors. Timely actions by IREDA and ADB to incorporate changes to reflect the shifting market conditions helped achieve the loan's complete use within the original time period. IREDA completed the Project within the loan closing date. However, withdrawals were permitted on expenditures incurred before the closing date, by an extension of the 3-month period permissible under ADB guidelines, merely to enable IREDA to avail of the benefit of LBL. ADB exhibited considerable flexibility in permitting realistic changes to the implementation arrangements (paras 10,13,14 and 15), which improved implementation quality (Appendix 2).

43. A subprojects' review and the incidence of subproject default to IREDA seem to indicate the need for some changes in RES incentives policies and their harmonization among the different states and with the electricity sector's pricing policy, pursuant to the passage of the Electricity Act 2003. IREDA could also benefit from enhanced institutional capability in terms of portfolio quality monitoring, commercial aspects of project appraisal, and environmental and social assessment. IREDA achieved considerable growth since loan approval. However, with the likelihood of a movement away from subsidies and a reduction in IREDA's developmental and subsidy-channeling role, IREDA would need to position itself as a financial institution that can leverage its technical strengths in the area of RES technology. Its future growth would critically hinge upon its ability to identify its strengths and chart out a clear road map for its corporate strategy and business plans.

44. ADB's maiden intervention in the Indian RES could be considered satisfactory. In view of the enormous untapped potential still in the country and the environmental benefits that the sector promises, ADB could consider options for developing the sector to the next level of widespread commercialization.

## **IV. ASSESSMENT AND RECOMMENDATIONS**

### **A. Relevance**

45. The Project was and continues to remain highly relevant, given the continued emphasis that ADB and India place on increased public power supply, through RES and increased private sector participation. The growth of privately sponsored RES technology projects and the maturing of technologies toward commercialization, during the last decade, testify to the Project's relevance. With the passage of the Electricity Act 2003, the emphasis is on increased competition, open access to transmission and distribution networks, merit order purchase, power trading, and time-bound restructuring of state electricity boards, leading to an enabling environment for reforms in the sector. Due to the relatively low share of power from RET projects and the time needed to reform the power sector in the new context, the act would not immediately result in significant impacts on RET projects. To prepare the sector for the emerging regulatory environment, harmonization of renewable energy policies with the overall power policy is needed. Reforms at the distribution level would set the stage for a more hands-off approach to creating incentives for private sector investments in RES technology projects.

## **B. Efficacy in Achievement of Purpose**

46. The Project was efficacious in meeting its objectives and exceeded the quantitative expectations in terms of capacities installed. The loan leveraged additional investments up to 2.13 times. The Project assisted in the quick installation of low gestation subprojects (6–9 months in the case of wind energy projects and 18–24 months for cogeneration projects). It aided IREDA's institutional strengthening, through the introduction of best procurement practices and the attached TA enhanced IREDA's capacities. Evaluation of subproject social and economic benefits revealed satisfactory results, with employment generation for 1,179 people; economic development of some remote areas, where subprojects were located; and living conditions improvement for the people who were offered employment. The Project did not reach locations that are currently not connected to the grid, but improvement in voltage reliability in project locations was reported. Environmental improvement benefits, based on actual power generation, were significant. The Project assisted in the role played by suppliers, developers, and operators of wind projects in the construction and operation and maintenance of wind energy projects that technically matured. The Project assisted the Government's shift in policy from funding technology driven government installations and RES development programs to commercialization, through subsidy provisions and making RES development demand driven. A direct result of IREDA's assistance to RES was the substantial growth in the sector since project approval and increased participation in RES by other lenders, thus reducing IREDA's share in financing of RET projects, equaling 30% of the total in 2003.

## **C. Efficiency in Achievement of Outputs and Purpose**

47. Project implementation was less than efficient, as reflected by lower EIRR and delays, at least initially, in ADB's responses. Operational performance of some subprojects was affected by a variety of factors, such as industrial recession, insufficient capability to assess project risks, frequent policy changes, and noncompliance under purchase agreements. EIRRs of subprojects were lower than efficient levels, subject to the caveat that these numbers do not take account of increased incomes of employees; other social benefits, such as improved infrastructure; and better power quality. IREDA needs to move towards risk-based pricing of its facility, so that investments will flow toward more efficient projects and promote resource use efficiency.

## **D. Preliminary Assessment of Sustainability**

48. IREDA grew from being a development arm of the Government for the promotion of RET projects to a fairly large financial intermediary, with an average growth rate of 35% during FY1995–FY2003. Although IREDA remained profitable and viable, its future targets to catalyze substantial investments in RET projects in a competitive environment call for the strengthening of its capacities in certain areas. For continued sustainability, IREDA needs to transform itself from being a promotional agency to being a vibrant and efficient commercially oriented lender, through reformulation of its operational processes, strengthened management, adoption of modern commercially oriented banking practices, and enhanced human resources. The initial feedback on subproject performance, environment impacts, and policy and institutional arrangements indicates that the Project is sustainable.

## **E. Other Impacts**

49. The Project's socioeconomic benefits include employment opportunities provision; voltage stability; spin-off benefits, such as provision of medical facilities for local residents from project sponsors; income improvement and resultant economic upgrading; and better road connectivity. The positive impact of the Project is significant.

## **F. Overall Assessment**

50. The Project, along with interventions by other multilateral and bilateral development agencies, assisted in the sector's growth, in general, and IREDA's growth as a lending institution, in particular. The Project succeeded in introducing global best practices within IREDA and among the subprojects assisted. It also strengthened IREDA's organizational and institutional capacities, to an extent, although moving on to the next level of professionalizing IREDA's management and processes is possible. The Project is rated as successful<sup>11</sup>.

## **G. Lessons Learned**

51. IREDA was successful in delivering the Government's agenda of promoting RET. IREDA's growth would be affected, unless the Government separates its multiple roles (owner of a financial intermediary and policy maker and regulator). The introduction of the Electricity Act 2003 set the stage for investments in the power sector, which will enable it to move where it can most efficiently deliver output. RET policy, which was under formulation, should be integrated into the overall power policy, and the incentives need to be harmonized across states. Exploitation of the large potential of RES within the time frame proposed by the Government requires reforms in incentives policy and effective incentives delivery. Sustainability of RET projects would also need consistent and transparent policies, channel-neutral incentives structures, and assurances to the sponsors of continuity of contractual obligations. Implementation experience confirmed the need and advisability of building in flexibility to introduce necessary change in scope. When dealing with a new executing agency, implementation efficiency can be improved, if more time is devoted during project processing to sensitizing the agency to ADB's procedures and requirements.

## **H. Recommendations**

52. Despite the creation of a large manufacturing base in RET during the last decade, commercialization of RET was limited by policy and resource constraints. To increase the share of RET in the total energy mix to 10%, from its current 3%, would require enormous resources, especially from the private sector. Government must consider announcing an integrated national energy policy, encouraging expansion of market-based credit delivery channels, and enabling policy measures for unleashing market-based investments by private sponsors. A cluster-cooperative approach in locations having a concentration of RES may be explored. IREDA must transform itself into a specialized but robust financial intermediary. In ADB's future sector interventions, project design could consider and support the aforesaid measures by the Government and IREDA and also support an institutional mechanism to deliver market-based credit. Future ADB interventions may consider the facilitation of RET projects to be established in areas that are not grid connected and focus on supporting policy development that would provide the needed incentives for the sector's market-based development. Future projects must also place sufficient emphasis on methods to monitor projects' socioeconomic benefits, an area that is weak in most projects that are delivered through an intermediary.

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<sup>11</sup> This project completion report is part of a sample of project completion reports independently reviewed by the Operations Evaluation Department. The review has validated the methodology used and the rating given.

## DETAILS OF SUBLOANS

**Table A1.1: Loan No. 1465-IND: Renewable Energy Development Project**

Subloan Number	Subborrower Description	Subloan Committed (\$)	Subloan Disbursed (\$)	Purpose
002	Sudalagunta Sugars Limited	917,091	917,091	Cogeneration
A01	Shamanur Sugars Limited	6,865,970	6,865,970	Cogeneration
A03	Renuka Sugars Limited	2,489,077	2,489,077	Cogeneration
A04	Tiru Arooran Sugars Limited	2,045,513	2,045,513	Cogeneration
A05	Ugar Sugar Works Limited	1,372,110	1,372,110	Cogeneration
A07	Prabhulingeswar Sugar Works Limited	5,804,749	5,804,749	Cogeneration
A08	Jammkhandi Sugars Limited	1,866,639	1,866,639	Cogeneration
A27	Kakatiya Cement And Sugar Industries Limited	6,747,133	6,747,133	Cogeneration
A43	Gmr Technologies And Industries	2,335,276	2,335,276	Cogeneration
A44	Arunachalam Sugars Limited	5,096,313	5,096,313	Cogeneration
A51	Gayatri Sugar Complex Limited	3,391,935	3,391,935	Cogeneration
A52	Sagar Sugar & Allied Products	5,529,702	5,529,702	Cogeneration
A60	Supreme Renewable Energy Limited (Srei)	7,595,067	7,595,067	Cogeneration
A65	Auro Energy Limited	3,281,509	3,281,509	Cogeneration
	<b>Subtotal</b>	<b>55,338,084</b>	<b>55,338,084</b>	
003	Ushdev International Limited	2,593,454	2,593,454	Wind
A02	Bajaj Electricals	2,027,997	2,027,997	Wind
A09	Bf Utilities Limited	3,846,552	3,846,552	Wind
A10	Bf Utilities Limited	2,817,234	2,817,234	Wind
A11	Enercon Winds Farms (India) Limited	3,192,507	3,192,507	Wind
A12	Enercon Winds Farms (India) Limited	2,711,758	2,711,758	Wind
A13	Goetze (India) Power Corporation Limited	2,940,608	2,940,608	Wind
A14	Savita Chemicals	612,366	612,366	Wind
A31	Goetze (India) Power Corporation Limited	2,691,202	2,691,202	Wind
A42	Tata Finance Limited	3,669,088	3,669,088	Wind
A45	Bf Utilities Limited	2,024,948	2,024,948	Wind
A49	Bf Utilities Limited	3,616,564	3,616,564	Wind
A53	Windia Power Limited	3,501,526	3,501,526	Wind
A54	Karma Energy Limited	3,130,587	3,130,587	Wind
A67	Encon Services Limited	973,575	973,575	Wind
	<b>Subtotal</b>	<b>40,349,966</b>	<b>40,349,966</b>	

Source : Asian Development Bank Loan Financial Information System

*Continued on next page*

Table A1.1 — Continued

Subloan Number	Subborrower Description	Subloan Committed (\$)	Subloan Disbursed (\$)	Purpose
A06	Various	1,066,780	1,066,780	Solar-Thermal
A15	Emmvee Solar Systems Private Limited	103,480	103,480	Solar-Thermal
A16	Karnataka Financial Services Limited	230,017	230,017	Solar-Thermal
A17	Kaushal Solar Equipment (Private) Limited	66,322	66,322	Solar-Thermal
A19	Non-Conventional Energy Development Corporation of Andhra Pradesh	165,488	165,488	Solar-Thermal
A20	PP Holdings Limited	58,286	58,286	Solar-Thermal
A22	Sudarshan Saur Shakti Private Limited	310,563	310,563	Solar-Thermal
A23	Sudarshan Saur Shakti Private Limited	138,963	138,963	Solar-Thermal
A24	Sudarshan Saur Shakti Private Limited	114,250	114,250	Solar-Thermal
A25	Ravi Precisions Private Limited	71,388	71,388	Solar-Thermal
A33	Ankur Scientific Energy Technologies Private Limited	70,074	70,074	Solar-Thermal
A34	Emmvee Solar Systems Private Limited	185,925	185,925	Solar-Thermal
A36	Srei International Finance Limited	128,715	128,715	Solar-Thermal
A38	Sunrise Solar Private Limited	54,335	54,335	Solar-Thermal
A39	Emmvee Solar Private Limited	138,110	138,110	Solar-Thermal
A40	Bipin Engineers Private Limited	51,333	51,333	Solar-Thermal
A50	Sudarshan Saur Shakti Private Limited	203,670	203,670	Solar-Thermal
A55	Emmvee Solar Systems Private Limited	255,824	255,824	Solar-Thermal
A56	Manipal Academy Of Higher Education	104,259	104,259	Solar-Thermal
A57	Deogiri Nagari Sahakari Bank Limited	66,007	66,007	Solar-Thermal
A58	Sudarshan Saur Shakti Private Limited	198,976	198,976	Solar-Thermal
A59	Emmvee Solar Systems Private Limited	308,960	308,960	Solar-Thermal
	<b>Subtotal</b>	<b>4,091,725</b>	<b>4,091,725</b>	
	<b>Total</b>	<b>99,779,775</b>	<b>99,779,775<sup>a</sup></b>	

<sup>a</sup> Out of \$100.00 million, \$0.22 million represents capitalization of interest cost and excess technical assistance cost recovered from the loan.



Table A1.2: Loan No. 1465-IND: Renewable Energy Development Project

Subloan Number	Subborrower Description	Installed Capacity (MW)	Location	Total Energy Generated per year million units	Energy Exported to Grid per year million units	Original Interest Rate %	Revised Interest Rate %	Subloan Tenor Years	Original FIRR %	Original EIRR %	Actual FIRR %	Actual EIRR %
<b>Bagasse-Based Cogeneration Power Plants</b>												
002	Sudalagunta Sugars Limited	8.0	Andhra Pradesh (AP), Chittoor	32.9	16.2	17.49	17.49	10	—	—	—	—
A01	Shamanur Sugars Limited	22.0	Karnataka, Davanger	91.8	60.6	17.00	17.00	10	—	—	—	—
A03	Renuka Sugars Limited	10.5	Karnataka, Belgaun	52.8	31.7	16.00	16.00	10	26.7	31.4	—	—
A04	Tiru Arooran Sugars Limited	19.0	Tamil Nadu (TN), Nagapattinam,	54.8	41.1	17.00	15.50	10	23.4	35.0	—	—
A05	Ugar Sugar Works Limited	28.0	Karnataka, Belgaun	78.6	30.4	18.00	17.00	10	24.7	35.3	—	—
A07	Prabhulingeswar Sugar Works Limited	17.5	Karnataka, Bagalkot	61.9	45.8	17.00	17.00	10	22.4	25.7	10.3	17.0
A08	Jammkhandi Sugars Limited	12.0	Karnataka	22.8	13.7	15.00	15.00	10	—	—	10.1	21.5
A27	Kakatiya Cement And Sugar Industries Limited	17.0	AP, Khammam	97.6	75.2	14.00	13.25	10	26.5	15.1	—	—
A43	Gmr Technologies And Industries	16.0	AP, Srikakulam	45.1	29.8	14.50	14.50	10	25.0	16.9	—	—
A44	Arunachalam Sugars Limited	19.0	TN, Tiruvannamalai	23.8	15.7	15.50	14.50	10	21.6	32.5	—	—
A51	Gayatri Sugar Complex Limited	22.0	AP, Nellore	—	—	16.00	16.00	10	22.1	34.3	—	—
A52	Sagar Sugar & Allied Products	20.0	AP, Chittoor	—	—	14.50	14.50	10	31.2	26.3	—	—
A60	Supreme Renewable Energy Limited	40.0	TN, Cuddlore	19.2	12.7	14.00	14.00	10	21.8	33.6	—	—
A65	Auro Energy Limited	16.0	TN, Tanjore	14.5	9.5	14.50	14.50	10	25.6	39.3	—	—
<b>Subtotal</b>		<b>267.0</b>		<b>595.8</b>	<b>382.4</b>							

AP = Andhra Pradesh, EIRR = economic internal rate of return, FIRR = financial internal rate of return, MW = megawatt, TN = Tamil Nadu.  
Source: Indian Renewable Energy Development Agency Limited's Report and Consultants' Report

*Continued on next page*

Table A1.2 — Continued

Subloan Number	Subborrower Description	Installed Capacity (MW)	Location	Total Energy Generated per year million units	Energy Exported to Grid per year million units	Original Interest Rate %	Revised Interest Rate %	Subloan Tenor Years	Original FIRR %	Original EIRR %	Actual FIRR %	Actual EIRR %
<b>Wind-Based Power Plants</b>												
003	Ushdev International Limited	2.5	TN, Periyar	6.6	6.6	19.00	14.50	7-10	—	—	—	—
A02	Bajaj Electricals	2.8	Maharashtra, Satara	4.4	4.4	13.50	13.50	10	19.6	12.4	—	—
A09	Bf Utilities Limited	3.9	Maharashtra, Satara	8.2	8.2	13.50	13.00	10	19.3	14.0	10.1	7.6
A10	Bf Utilities Limited	3.0	Maharashtra, Satara	6.9	6.9	13.00	13.00	10	19.5	14.9	11.6	8.3
A11	Enercon Winds Farms (India) Limited	4.2	Karnataka, Chitradurga	12.0	12.0	14.00	13.00	10	20.0	12.1	—	—
A12	Enercon Winds Farms (India) Limited	4.2	Karnataka, Chitradurga	12.0	12.0	14.00	14.00	10	22.3	12.6	—	—
A13	Goetze (India) Power Corporation Limited	3.0	Madhya Pradesh (MP), Dewas	5.3	5.3	13.00	13.00	10	16.8	12.9	—	—
A14	Savita Chemicals	1.1	Maharashtra, Satara	1.5	1.5	13.50	13.50	10	24.0	13.3	—	—
A31	Goetze (India) Power Corporation Limited	3.0	MP, Dewas	5.3	5.3	14.00	14.00	10	—	—	—	—
A42	Tata Finance Limited	4.8	Karnataka, Chitradurga	11.4	11.4	13.50	11.00	10	14.0	12.7	—	—
A45	Bf Utilities Limited	2.8	Maharashtra, Satara	5.8	5.8	13.00	13.00	10	28.2	14.2	22.3	9.7
A49	Bf Utilities Limited	4.2	Maharashtra, Satara	8.2	8.2	13.00	13.00	10	21.5	12.4	13.2	8.3
A53	Windia Power Limited	4.5	Maharashtra, Satara	9.2	9.2	13.50	13.00	10	—	—	16.9	8.9
A54	Karma Energy Limited	4.5	Maharashtra, Satara	7.7	7.7	13.00	13.00	10	21.8	15.0	16.4	8.6
A67	Encon Services Limited	3.0	Karnataka, Chitradurga	4.7	4.7	13.50	13.50	10	—	—	—	—
	<b>Subtotal</b>	<b>51.5</b>		<b>109.2</b>	<b>109.2</b>							
	<b>Total</b>	<b>318.5</b>		<b>705.0</b>	<b>491.6</b>							

MP = Madhya Pradesh.

**Table A1.3: Loan No. 1465-IND: Renewable Energy Development Project**  
(Disbursement of Subloans by States)

State	Cogeneration		Wind		Solar-Thermal	
	No. of Projects	ADB Loan (\$)	No. of Projects	ADB Loan (\$)	No. of Projects	ADB Loan (\$)
Maharashtra	0	0	8	21,577,774	11	2,346,538
Karnataka	5	18,398,546	4	10,546,927	8	1,380,910
Madhya Pradesh	0	0	2	5,631,811	0	0
Tamil Nadu	4	18,018,402	1	2,593,454	0	0
Andhra Pradesh	5	18,921,136	0	0	1	165,488
Gujarat	0	0	0	0	1	70,074
West Bengal	0	0	0	0	1	128,715
<b>Total</b>	<b>14</b>	<b>55,338,084</b>	<b>15</b>	<b>40,349,966</b>	<b>22</b>	<b>4,091,725</b>

Source : Indian Renewable Development Agency Limited's Report.

**Table A1.4: Loan No. 1465-IND: Renewable Energy Development Project**  
(Project Cost and Means of Finance)  
(Rs million)

Subloan Number	Subborrower Description	Means of Finance				Total Cost of the Subproject	Break up of Project Cost			
		Promoters Contribution (Internal Accrual or Private Placement or Unsecured Loans)	ADB's Contribution	IREDA's Contribution	Other Loans or Subsidies		Land and Building	Equipment	Others	Total Cost of the Subproject
<b>Bagasse-Based Cogeneration Power Plants</b>										
002	Sudalagunta Sugars Limited	57	39	110	0	206	16	149	41	206
A01	Shamanur Sugars Limited	135	300	0	73	508	26	425	57	508
A03	Renuka Sugars Limited	62	111	17	58	248	17	190	41	248
A04	Tiru Arooran Sugars Limited	115	80	120	144	459	24	321	114	459
A05	Ugar Sugar Works Limited	130	60	90	196	476	43	332	101	476
A07	Prabhulingeswar Sugar Works Limited	115	266	34	102	517	63	368	86	517
A08	Jammkhandi Sugars Limited	82	91	122	36	331	23	219	89	331
A27	Kakatiya Cement And Sugar Industries Limited	122	326	40	0	488	30	366	92	488
A43	Gmr Technologies And Industries	82	116	132	0	330	31	255	45	331
A44	Arunachalam Sugars Limited	143	241	171	0	555	48	423	83	554
A51	Gayatri Sugar Complex Limited	155	161	289	0	605	45	470	91	606
A52	Sagar Sugar And Allied Products	155	267	183	18	623	55	426	142	623
A60	Supreme Renewable Energy Limited	380	369	166	348	1,263	85	976	202	1,263
A65	Auro Energy Limited	87	160	100	0	347	35	248	64	347
	<b>Subtotal</b>	<b>1,820</b>	<b>2,587</b>	<b>1,574</b>	<b>975</b>	<b>6,956</b>	<b>541</b>	<b>5,168</b>	<b>1,248</b>	<b>6,957</b>
	<b>\$ Equivalent</b>	<b>39</b>	<b>55</b>	<b>34</b>	<b>21</b>	<b>149</b>	<b>12</b>	<b>110</b>	<b>27</b>	<b>149</b>

ADB = Asian Development Bank, IREDA = Indian Renewable Energy Development Agency Limited.

Source: Indian Renewable Energy Development Agency Limited's Report and Consultants' Report

*Continued on next page*

Subloan Number	Subborrower Description	Means of Finance				Break up of Project Cost				
		Promoters Contribution (Internal Accrual or Private Placement or Unsecured Loans)	ADB's Contribution	IREDA's Contribution	Other Loans or Subsidies	Total Cost of the Subproject	Land and Building	Equipment	Others	Total Cost of the Subproject
<b>Wind-Based Power Plants</b>										
003	Ushdev International Limited	35	104	0	2	141	5	130	5	140
A02	Bajaj Electricals	39	93	0	0	132	7	118	7	132
A09	Bf Utilities Limited	58	173	0	2	233	7	216	10	233
A10	Bf Utilities Limited	44	132	0	0	176	4	166	5	175
A11	Enercon Winds Farms (India) Limited	83	153	0	0	236	2	231	3	236
A12	Enercon Winds Farms (India) Limited	83	130	23	0	236	2	231	3	236
A13	Goetze (India) Power Corporation Limited	45	132	0	0	177	1	172	4	177
A14	Savita Chemicals	13	36	0	0	49	1	45	2	48
A31	Goetze (India) Power Corporation Limited	39	117	0	0	156	0	120	36	156
A42	Tata Finance Limited	57	172	0	0	229	4	205	21	230
A45	Bf Utilities Limited	33	97	2	0	132	5	117	10	132
A49	Bf Utilities Limited	58	174	0	0	232	9	190	33	232
A53	Windia Power Limited	56	165	0	2	223	10	201	13	224
A54	Karma Energy Limited	58	152	21	0	231	6	182	42	230
A67	Encon Services Limited	50	47	60	0	157	14	132	12	158
	<b>Subtotal</b>	<b>751</b>	<b>1,877</b>	<b>106</b>	<b>6</b>	<b>2,740</b>	<b>77</b>	<b>2,456</b>	<b>206</b>	<b>2,739</b>
	<b>\$ Equivalent</b>	<b>16</b>	<b>40</b>	<b>3</b>	<b>0</b>	<b>59</b>	<b>2</b>	<b>53</b>	<b>4</b>	<b>59</b>
	<b>Solar-Thermal Subprojects</b>	<b>43</b>	<b>188</b>	<b>0</b>	<b>0</b>	<b>231</b>	<b>0</b>	<b>231</b>	<b>0</b>	<b>231</b>
	<b>\$ Equivalent</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>5</b>
	<b>Total</b>	<b>2,614</b>	<b>4,652</b>	<b>1,680</b>	<b>981</b>	<b>9,927</b>	<b>618</b>	<b>7,855</b>	<b>1,454</b>	<b>9,927</b>
	<b>\$ Equivalent</b>	<b>56</b>	<b>99</b>	<b>37</b>	<b>21</b>	<b>213</b>	<b>14</b>	<b>168</b>	<b>31</b>	<b>213</b>

Table A1.4 — Continued

**Table A1.5: Loan No. 1465-IND: Renewable Energy Development Project**  
(Environmental and Social Benefits)

Subloan Number	Subborrower Description	Coal Saved (Million kg per year)	Savings in Emissions (Million kg per year)				Employment Generated (No. of Persons)
			SO <sub>x</sub>	CO <sub>2</sub>	Fly Ash	Others, if any NO <sub>x</sub>	
<b>Bagasse-Based Cogeneration Power Plants</b>							
002	Sudalagunta Sugars Limited	23.70	0.26	32.92	9.05	0.20	8
A01	Shamanur Sugars Limited	66.10	0.73	91.80	25.25	0.55	155
A03	Renuka Sugars Limited	38.04	0.42	52.83	14.53	0.32	117
A04	Tiru Arooran Sugars Limited	39.46	0.44	54.81	15.07	0.33	—
A05	Ugar Sugar Works Limited	56.61	0.63	78.63	21.62	0.47	—
A07	Prabhulingeswar Sugar Works Limited	44.55	0.49	61.87	17.01	0.37	100
A08	Jammkhandi Sugars Limited	16.44	0.18	22.84	6.28	0.14	96
A27	Kakatiya Cement And Sugar Industries Limited	70.31	0.78	97.65	26.85	0.59	100
A43	Gmr Technologies And Industries	32.50	0.36	45.14	12.41	0.27	100
A44	Arunachalam Sugars Limited	17.16	0.19	23.84	6.56	0.14	162
A51	Gayatri Sugar Complex Limited	—	—	—	—	—	—
A52	Sagar Sugar And Allied Products	—	—	—	—	—	—
A60	Supreme Renewable Energy Limited	13.83	0.15	19.21	5.28	0.12	150
A65	Auro Energy Limited	10.46	0.12	14.53	4.00	0.09	100
	<b>Subtotal</b>	<b>429.16</b>	<b>4.75</b>	<b>596.07</b>	<b>163.91</b>	<b>3.58</b>	<b>1,088</b>
<b>Wind-Based Power Plants</b>							
003	Ushdev International Limited	4.75	0.05	6.60	1.82	0.04	6
A02	Bajaj Electricals	3.18	0.04	4.42	1.22	0.03	6
A09	Bf Utilities Limited	5.88	0.07	8.16	2.24	0.05	8
A10	Bf Utilities Limited	4.93	0.05	6.85	1.88	0.04	5
A11	Enercon Winds Farms (India) Limited	8.63	0.10	11.99	3.30	0.07	7
A12	Enercon Winds Farms (India) Limited	8.63	0.10	11.99	3.30	0.07	9
A13	Goetze (India) Power Corporation Limited	3.80	0.04	5.28	1.45	0.03	6
A14	Savita Chemicals	1.04	0.01	1.45	0.40	0.01	—
A31	Goetze (India) Power Corporation Limited	3.79	0.04	5.26	1.45	0.03	6
A42	Tata Finance Limited	8.20	0.09	11.39	3.13	0.07	7
A45	Bf Utilities Limited	4.18	0.05	5.81	1.60	0.03	3
A49	Bf Utilities Limited	5.88	0.07	8.16	2.24	0.05	3
A53	Windia Power Limited	6.66	0.07	9.25	2.54	0.06	15
A54	Karma Energy Limited	5.55	0.06	7.71	2.12	0.05	10
A67	Encon Services Limited	3.35	0.04	4.65	1.28	0.03	—
	<b>Subtotal</b>	<b>78.45</b>	<b>0.88</b>	<b>108.97</b>	<b>29.97</b>	<b>0.65</b>	<b>91</b>
	<b>Total</b>	<b>507.61</b>	<b>5.63</b>	<b>705.04</b>	<b>193.88</b>	<b>4.23</b>	<b>1,179</b>

CO<sub>2</sub> = Carbon Dioxide, kg = Kilograms, NO<sub>x</sub> = Nitrogen Oxides, SO<sub>x</sub> = Sulphur Oxides.

Source: Indian Renewable Energy Development Agency Limited's Report and Consultants' Report.

## CHRONOLOGY OF MAIN EVENTS IN PROJECT ADMINISTRATION

Date	Event
<b>1995</b>	
15 May	Consultants submitted the final report for TA No. 1953-IND <sup>a</sup> .
20 May–3 June	Fact-Finding Mission was conducted for undertaking preparatory work on the proposed Project.
11 July	Management review meeting was held.
21 Aug–4 Sep	Appraisal Mission was conducted. This mission addressed the major issue of the Indian Renewable Energy Development Agency Limited's (IREDA's) loan cost vis-à-vis its return from lending activities. The issue was earlier raised in the management review meeting. The mission noted that as IREDA was in receipt of assistance from other development agencies (grant funds and interest free loans), the pooling of all its funds would give IREDA a spread of around 8%, which was sufficient to cover its costs.
16 Sep	IREDA's Board of Directors approved \$150 million loan from the Asian Development Bank (ADB).
<b>1996</b>	
26 Feb	Staff review committee meeting was held.
18 Apr	Ministry of Non-Conventional Energy Sources (MNES) sent a letter to ADB recommending a loan of \$100 million.
29 Jul	Retroactive financing was approved for expenditures incurred between 1 September 1995 and the effective date of the loan, subject to a maximum of \$10 million.
26–28 Aug	Loan negotiations were held.
26 Sep	ADB's Board of Directors approved a \$100 million loan and technical assistance of \$0.6 million.
<b>1997</b>	
23 Apr	IREDA and ADB signed the Loan Agreement and the Government of India signed the Guarantee Agreement.
15 Jul	Loan was declared effective.
30 Jul	Term Loan Agreement was signed between IREDA and Bank of Baroda for foreign exchange risk management.
6–8 Aug	Inception Mission was conducted.
24 Sep	IREDA accepted technical assistance.
29 Sep	Loan Disbursement Handbook was distributed to IREDA.
1 Oct	Reserve Bank of India (RBI) approved the opening of an imprest account with Canara Bank. Canara Bank issued a comfort letter to ADB.
31 Oct	ADB approved the first subprojects in bagasse-based cogeneration and the wind sectors. The pilot subprojects in the bagasse-based cogeneration sector and the wind sector were Sudalagunta Sugars Limited and Ushdev International Limited, for \$0.92 million and \$2.59 million.

- million, respectively.
- 17 Dec RBI approved, in principle, the opening of a dollar deposit account with Bank of Baroda.
- 18 Dec Comfort letter was received from Bank of Baroda for the dollar deposit account.
- 26 Dec First disbursement was made under the Project (\$4.84 million).
- 29 Dec ADB advanced \$15 million to IREDA's imprest account.

### 1998

- 9 July Meeting was held with IREDA officials. The important issues discussed were: (i) a request for an increased allocation for bagasse-based cogeneration, from the current \$20 million, as this sector seemed to have the most potential; and (ii) an inquiry as to whether solar-thermal systems could be assisted through financial intermediaries.
- 21 Aug Subloan was approved for Shamanur Sugars Limited, for \$6.87 million.
- 1 Sep Administration of the Project was delegated to the India Resident Mission, other than approvals of subprojects, which continued to be administered from ADB headquarters.
- 8 Sep IREDA requested that financial intermediaries be allowed to avail of loans under ADB's Solar-Thermal Program.
- 11 Sep Consultants selection committee meeting was held for TA 2648-IND<sup>b</sup>. The four consultants on the shortlist were ranked, and the first-ranked consultant (the US consultant) was invited for contract negotiation.
- 10 Dec Disbursement against Withdrawal Application No. 02 and 03 was refused, due to IREDA's failure to withdraw loan proceeds from the Bank of Baroda against the imprest advance.
- 29 Dec IREDA responded to the nonuse of the imprest account, due to availability of cheaper funds.

### 1999

- 24 Feb Bilateral review meeting was held. The major issues discussed were: (i) loan's slow progress, due to an industrial slowdown, especially in the solar and biomethanation sectors; (ii) sector allocation review or partial cancellation of the Project, to be done after noting the progress until April 1999; and (iii) imprest refund, in case IREDA was unable to withdraw the rupee equivalent of the imprest advance from Bank of Baroda.
- 11 Mar Procurement procedures were relaxed for solar-thermal systems costing less than \$50,000.
- 26 May Subloan approved for Prabhulingeswar Sugar Works Limited, for \$5.8 million.
- 24 June IREDA sent a letter to ADB, requesting the discontinuance of the imprest account procedure and conveying a decision to withdraw under the reimbursement procedure. IREDA requested for a reallocation of sector limits under the Project, based on market conditions.
- 20 Aug Imprest amount of \$15 million was refunded.



27 Aug	IREDA confirmed the withdrawal of the rupee equivalent of \$8.18 million against the reimbursement application submitted.
15 Sep	IREDA repeated its request to allow financial intermediaries to avail of loans under ADB's Solar Thermal Program.
13–16 Sep	Review Mission, comprising S.H. Zaidi, P. L. Pattison, and V.V. Subramanian, was fielded. The issues discussed during the mission were: (i) procedure for drawdown under ADB's reimbursement procedure and IREDA's swap arrangement; (ii) IREDA's constraints, scope, and future plans related to improving overall performance and accelerating disbursements under the loan; (iii) issues that were sector specific and restricted progress and measures for improvement.
12 Oct	ADB approved the following matters: (i) IREDA to negotiate with other financial institutions for more favorable swap arrangements; (ii) adoption of procurement procedures applicable to development finance institutions; (iii) financing intermediaries for onlending to potential end users of solar-thermal equipment; and (iv) financing project developers in the wind sector.
16 Nov	Subloans were approved for Bajaj Electricals, Renuka Sugars Limited, Tiru Arooran Sugars Limited, and Ugar Sugars Limited, for \$2.03 million, \$2.49 million, \$2.05 million, and \$1.37 million, respectively.
7 Dec	Subloans were approved for BF Utilities Limited (two subloans), Enercon Winds Farms (India) Limited (two subloans), and Goetze (India) Power Corporation Limited, for \$3.85 million and \$2.82 million, \$3.19 million and \$2.71 million, and \$2.94 million, respectively.
8 Dec	Subloan was approved for Savita Chemicals, for \$0.61 million.
9 Dec	IREDA requested a one-time waiver of the requirement, under Section 3.04 of the Loan Agreement, which stipulated non-withdrawal of amounts against the applications for reimbursement for expenditure incurred more than 180 days prior to the receipt of such application by ADB, for \$12 million.
10 Dec	Subloan was approved for Goetze (India) Power Corporation Limited, for \$2.69 million.
10 Dec	IREDA requested to reduce promoters' contributions from 25% to 15% for solar-thermal projects, in line with the revised lending norms issued by MNES.
13 Dec	ADB approved a one-time waiver of the requirements under Section 3.04 of the Loan Agreement.
<b>2000</b>	
21 Jan	Repeat reminder issued for approval of earlier request for reduction of promoters' contribution from 25% to 15% for solar-thermal projects.
15 Mar	ADB headquarters does not object to a reduction of promoters' contribution from 25% to 15% for solar-thermal projects. India Resident Mission delegated to take appropriate action on any future IREDA requests for subloan approval under the four categories
28 Jun	Subloans were approved for Arunachalam Sugars Limited, GMR Technologies And Industries, and TATA Finance Limited, for \$5.1 million, \$2.33 million, and \$3.67 million, respectively.
30 Jun	Subloan was approved for BF Utilities Limited, for \$2.02 million

9 Oct–9 Nov	Random audit was carried out, involving procurement, disbursement, and financial audits. The findings of the audit were as follows: (i) IREDA followed the international shopping procedures for items with costs equivalent to \$5.0 million or less, but more than \$0.2 million, despite the relaxation by ADB for IREDA to adopt procurement procedures applicable to development finance institutions; (ii) IREDA was generally in compliance with disbursements procedures; and (iii) IREDA generally followed regular procedures for making disbursements to its borrowers but was advised to obtain full particulars of promoters' contributions and ensure actual expenditure was incurred and disbursed by subborrowers before it disbursed funds for subprojects.
6 Nov	Lender and development agencies met. Participants (ADB, IREDA, Kreditanstalt für Wiederaufbau and World Bank) discussed IREDA's deteriorating financial performance and appropriate strategies to improve the situation. PricewaterhouseCoopers did a study on the portfolio audit and diagnostic study for formulating a strategic action plan.
6–17 Nov 11 Dec	Country portfolio review meetings were held. Subloan was approved for Kakatiya Cement And Sugar Industries Limited, for \$6.75 million
27 Dec 2001–5 Jan 2001	Review Mission, comprising T. Kandiah and V.V. Subramanian, was fielded. The key findings of the mission were: (i) IREDA needed to step up its efforts in recoveries and reduce the level of nonperforming loans; (ii) MNES and the Government should continue supporting IREDA's developmental efforts, through incentive policies and equity infusion; and (iii) IREDA was generally in compliance with loan covenants but had yet to induct representatives of financial institutions and the private sector to its Board of Directors.

## 2001

26 Mar	Subloan was approved for BF Utilities Limited, for \$3.62 million.
6 Aug	Subloan was approved for Supreme Renewable Energy Limited, for \$7.6 million.
27 Aug	IREDA requested the waiving of the requirement of the unused loan amount should not be less than 40% for conversion to a LIBOR-based loan (LBL).
18 Sep–12 Oct	Review Mission, comprising T. Kandiah and M. Ravi, was fielded. The key findings of the mission were as follows: (i) IREDA achieved a highly satisfactory level of commitments under the loan; (ii) IREDA should consider postponement of further withdrawals to avail of the LBL facility; (iii) IREDA needed to strengthen its project monitoring during the postcommissioning stage, to improve recovery; and (iv) IREDA was generally in compliance with loan covenants and had a broad-based Board of Directors but was yet to induct representatives of financial institutions.
28 Sep	Subloan approved for Auro Energy Limited, for \$3.28 million.
10 Oct	ADB advised IREDA that the cutoff for determining eligibility under LBL would be 1 July 2001, instead of 31 December 2001, (for determining the 40% limit for conversion to LBL). But disbursements

	under LBL were to be made only after 30 July 2002.
29 Nov	Subloans were approved for Gayatri Sugar Complex Limited, Sagar Sugar And Allied Products, and Windia Power Limited, for \$3.39 million, \$5.53 million, and \$3.50 million, respectively.
1 Dec	Subloan was approved for Karma Energy Limited, for \$3.13 million.
14 Dec	ADB advised IREDA on the implementation schedule for conversion to LBL.

## 2002

2 Jan	ADB communicated with IREDA regarding IREDA's filing an option for conversion of the unused portion (\$43.09 million) of the loan from pool-based single currency loan (PBSCL) to LBL, effective 31 July 2002.
8 Feb	IREDA accepted ADB's proposal for transforming the unused portion (\$43.09 million) of the loan from PBSCL to LBL, effective 31 July 2002.
8 Feb	IREDA issued a letter to the Government requesting the Government to notify ADB of IREDA's acceptance of the transformation of the unused portion (\$43.09 million) of the loan from PBSCL to LBL, effective 31 July 2002.
24 Apr	Tripartite review meeting was held. The matters discussed in the meeting were as follows: (i) IREDA would continue submission of its withdrawal application beyond the disbursed \$56.9 million, but actual disbursement would take place only after 31 July 2002, to avail of LBL benefits; (ii) government equity of Rs270 million, for FY2002, and Rs350 million, for FY2003, was confirmed; and (iii) Board of Director's nomination was discussed with MNES.
20 May	ADB sent a letter to IREDA, along with the Amended and Restated Loan Agreement (ARLA), which indicated the various conditions required, which were to be fulfilled by IREDA, for making the ARLA effective. The conditions were: (i) IREDA's acceptance of ARLA; (ii) Government of India's issuance of a consent letter, stating that it would act as the Guarantor to ARLA; and (iii) submission of a legal opinion.
20 Jun	Letter of acceptance was issued by IREDA, indicating its acceptance of ARLA.
3 Jul	Power of Attorney was issued, authorizing the Indian Ambassador in Manila to sign ARLA.
15 Jul	Subloan approved for Encon Services Limited, for \$0.98 million.
17 Jul	Ambassador of India to the Philippines and ADB Vice President (Operations 1) signed the ARLA.
25 Jul	Government of India's consent letter (dated 24 July 2002) regarding ARLA was received.
26 Jul	Office of the General Counsel confirmed the fulfillment of legal conditions to effectiveness of ARLA, based on review of the legal opinion (received on the same day) and consent from the Guarantor.
26 Jul	ARLA was declared effective.
29 Jul	Country Director declared ARLA effective, as of 26 July 2002.
9–24 Oct	Review Mission, comprising M. Ravi, was fielded. The mission undertook site visits to cogeneration and solar-thermal subprojects.

	The key findings of the mission were: (i) IREDA achieved satisfactory and complete use of the loan; and (ii) IREDA needed to strengthen its internal processes for improved corporate governance, asset liability management, and risk-management systems.
25 Oct	Loan was closed.
14 Nov	IREDA issued a letter requesting that: (i) IREDA's decision for partial closure of \$43.09 million, under the PBSCL portion of the loan, be noted; (ii) waiver of 45 days' notice for prepayment be issued; (iii) waiver of prepayment charges be issued; and (iv) refixation of the installment amount be taken, after partial payment.
28 Nov	ADB's responses to IREDA's prepayment requests were issued and were as follows:(i) the prepayment charges could be waived only if the loan amount to be prepaid was correspondingly prepaid by the subborrower, without any prepayment charges. ADB, therefore, requested IREDA to provide such details; (ii) the Government must endorse the prepayment; and (iii) the waiver of 45 days' notice would be considered along with the waiver of prepayment charges.
<b>2003</b>	
8 Jan	ADB issued its final response regarding the prepayment to IREDA, which indicated that it (i) was unable to waive prepayment charges, in light of its policy and due to the unavailability of subloans prepaid without prepayment charges; and (ii) had fixed the prepayment date as 15 January 2003.
10 Jan	IREDA conveyed a delay in the date of prepayment, pending receipt of approvals from the Government, RBI, and Bank of Baroda.
30 May	Prepayment of partial loan was made by IREDA, along with the prepayment premium.

ADB = Asian Development Bank, ARLA = Amended and Restated Loan Agreement, IREDA = Indian Renewable Energy Development Agency Limited, LBL = LIBOR-based loan, MNES = Ministry of Non-Conventional Energy Sources, PBSCL = pool-based single currency loan, RBI = Reserve Bank of India.

<sup>a</sup> ADB. 1993. *Technical Assistance to India for Renewable Energy Development Project*. Manila.

<sup>b</sup> ADB. 1996. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grant to the Indian Renewable Energy Development Agency Limited for the Renewable Energy Development Project*. Manila.

## **METHODOLOGY FOR COMPUTATION OF FINANCIAL INTERNAL RATE OF RETURN AND ECONOMIC INTERNAL RATE OF RETURN**

### **I. FINANCIAL INTERNAL RATE OF RETURN**

1. Financial Internal Rate of Return (FIRR) is the rate of return at which the present value of stream of incremental net flows in financial prices is zero. If the FIRR is equal to or greater than the financial opportunity cost of capital, a project is considered financially viable. Thus, financial benefit-cost analysis covers the profitability aspect of a project.

#### **A. Projected**

2. The original FIRR for the subprojects was calculated based on the projected cash flow and profitability statements submitted by the subborrowers at the initial project appraisal stage.

#### **B. Actual**

3. The actual FIRR was calculated only for those subprojects where the actual cash flow statements were made available by the subborrowers to staff consultants. The period for which actual cash flow statements were available ranged from 2 to 5 years for some subprojects. Further projections were based on net cash inflow for subsequent years being constant.

### **II. ECONOMIC INTERNAL RATE OF RETURN**

4. Economic Internal Rate of Return (EIRR) is the rate of return for which the present value of net benefit stream becomes zero, or at which the present value of the benefit stream is equal to the present value of the cost stream. For a project to be acceptable, EIRR should be greater than the economic opportunity cost of capital.

5. The basic difference between the financial and economic benefit-cost analysis of a project is that the former compares the benefits and costs to the enterprise in constant financial prices, while the latter compares the benefits and costs to the whole economy in constant economic prices. Economic prices reflect the true cost and value to the economy of goods and services, after adjustment for the effects of government interventions and distortions in the market structure, through shadow pricing of the financial prices.

6. Indirect taxes and subsidies are important to understanding the difference between economic and financial prices. For project output, the economic price exceeds the financial price by at least the amount of the indirect tax, whereas for project input, the financial price exceeds the economic price by at least the amount of the indirect tax. This result applies whether project output or input is tradable or not tradable.

7. EIRR was estimated using the following steps: (i) quantifying all project-related financial costs (capital costs and operating costs), in terms of economic costs; (ii) quantifying economic benefits of a project and converting them in rupee terms; (iii) calculating a project's initial EIRR, based on projected cash flow statements submitted at the initial project appraisal stage and actual EIRR based on the available actual cash flow statements.

## A. Economic Costs

8. The economic cost of a project was divided as capital cost and operating cost.

### 1. Capital Costs

9. The financial capital cost of a project was converted into economic terms by applying the social conversion factors (SCF) to actual rupee cost. The SCF is the ratio between the economic price value and the financial value for a project output or input. This ratio is applied to the constant price financial values in project analysis, to derive the corresponding economic values. The SCF removes distortions, such as taxes, subsidies, and other distortions that might affect the financial value from the financial cost of each of the cost components. The SCF assumed for capital cost components is given in Table A3.1.

**Table A3.1: Social Conversion Factors for Capital Costs**

S.No.	Item	Social Conversion Factors
1.	Land	0.67 for cogeneration projects 0.57 for wind projects (as wind projects are established on barren land that has limited alternate usage)
2.	Building and Construction	0.59
3.	Indigenous Equipment	0.70 for cogeneration projects [for wind projects, cost-insurance-freight (CIF) price was used for the imported components of the equipment cost. The components imported are exempted from customs duties.]
4.	Consultancy Fees	1.50
5.	Preoperative Expenses	1.00
6.	Contingency Fund	1.00
7.	Other Expenses	1.00

Source: Adapted from Industrial Development Bank of India's Norms.

### 2. Operating Costs

10. The various components of the annual operating cost were classified as raw material cost, which includes fuel cost and other consumables; salaries and wages cost; and repair and operation and maintenance cost. The SCF assumed for converting the operating cost in economic terms is given in Table A3.2.

**Table A3.2: Social Conversion Factors for operating costs**

S.No.	Item	Social Conversion Factors
1.	Raw Material Cost	0.80
2.	Salary for Skilled Labor	1.00
3.	Salary for Unskilled Labor	0.50
4.	Repair and Operations and Maintenance Cost	0.67

Source: Adapted from Industrial Development Bank of India's Norms.

## B. Economic Benefits

11. A project's economic benefits were divided into two parts: (i) economic revenues and (ii) energy and environment benefits.

12. As the subprojects under consideration did not generate any additional employment outside the project, external and/or indirect employment benefits were not considered when estimating the economic benefits. Total economic benefit is the sum of economic revenue and environment benefit that accrues after project commissioning. As the economic benefit is exclusive of all distortions, such as interest subsidies and sales tax benefits, these components were not considered when estimating the economic benefit. The approach for estimating these benefits and converting them in rupee value terms is discussed in the following section.

### 1. Economic Revenue

13. The financial revenue in the projected cash flow statements from the sale of energy was estimated using the following equation:

Financial Revenue of Project = Energy Produced in kilowatt-hour (kWh) X Rate of Supply to State Electricity Board (SEB) as agreed in the Power Purchase Agreement (PPA) in Rs per kWh.

14. The Economic revenue of the Project was estimated using the following equation:

Economic Revenue of Project = Energy Produced in kWh X Average Power Purchase Cost in Respective States in Rs per kWh.

15. The next best alternative of power supply for SEB, in lieu of energy supplied from a particular renewable energy-based power plant, is to purchase power from other sources, such as central generating stations, independent power producers, or other renewable energy sources. Therefore, the average power purchase cost for each respective state has been assumed for estimating the economic revenue, as given in Table A3.3

**Table 1.3: Average Power Purchase Cost**

S.No.	State	(Rs per kWh)
1.	Tamil Nadu	2.80
2.	Karnataka	2.30
3.	Andhra Pradesh	1.80
4.	Maharashtra	2.60
5.	Madhya Pradesh	2.11

kWh = kilowatt-hour, Rs = Rupees.

Source: Tabulated from tariff orders of respective states.

### 2. Environment Benefits

16. For the purpose of determination of credit for zero emission and environment friendly renewable energy generation, the scope of this exercise was limited to determination of benefits of reduction in air pollution only. The parameters for the measure of air pollution that were considered are sulfur oxides (SO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>) and carbon dioxide (CO<sub>2</sub>). The savings in these pollutants, if 1 kWh of energy was produced through renewable energy-based projects, as against energy generated through a conventional thermal power plant, is given in Table A3.4.

**Table A3.4: Assumption for Energy Saved for Producing 1 kWh of Energy**

S.No.	Particulars	(Kg per kWh)
1.	SO <sub>x</sub>	0.0008
2.	CO <sub>2</sub>	1.0000
3.	NO <sub>x</sub>	0.0060
4.	Coal	0.7200
5.	Fly Ash	0.2750

CO<sub>2</sub> = carbon dioxide, Kg = kilogram, kWh = kilowatt-hour, NO<sub>x</sub> = nitrogen oxides, SO<sub>x</sub> = sulfur oxides  
Source: Indian Renewable Energy Development Agency Limited.

### C. Quantifying Environment Benefits

17. To quantify the environment benefits of NO<sub>x</sub> and SO<sub>x</sub> in rupee value, the cost that would have been incurred in implementing emission abatement technology in the power plant was assumed to be the environment benefit, as a result of generating energy from renewable energy sources.

18. To determine the credit to be given for renewable energy generation, cost of conventional thermal cycle generation needs to be loaded, on account of the environmental emission caused by these technologies. Although, emission abatement technologies, when deployed, help to reduce emission levels, they cannot achieve zero emission, as is the case for renewable energy generation. Hence, the cost of generation of the conventional thermal generation can be loaded to the extent of additional cost (capital and operating) required to be incurred by these plants in order to deploy abatement equipment and technologies.

19. The incremental cost of generation for emission abatement technology being considered for three fuel cycle cases is given in Table A3.5.

**Table A3.5: Incremental Cost of Generation for Emission Abatement**

Power Generation Technology	Units	Conventional Thermal	Combined Cycle Gas Turbine	Engine Driven
Fuel		Coal	Naphtha or Natural Gas	Fuel Oil or Heavy Fuel Oil
SO <sub>x</sub> Abatement Technology	Rs/kWh	0.19		0.29
NO <sub>x</sub> Abatement Technology	Rs/kWh	0.05	0.04	0.03

Rs/kWh = Rupees per kilowatt-hour, NO<sub>x</sub> = nitrogen oxides, SO<sub>x</sub> = sulfur oxides

Source: ICRA Limited. 2003. Study on Tariff Policy for Power Generation from Renewable Sources.

20. Most of the power installations in India are conventional thermal steam generating stations using coal as a fuel. Hence, it would only be pertinent to consider the incremental cost of generation under this fuel cycle for credit to emission-free renewable energy generation. This incremental cost for each technology, when multiplied by the total energy produced in kWh, would give the total benefit (NO<sub>x</sub> and SO<sub>x</sub>) in rupee terms for producing energy from renewable energy sources.



21. The price range for trading of CO<sub>2</sub> emissions in India is between \$1 and \$6 per ton of CO<sub>2</sub><sup>a</sup>. The following standards were used to estimate CO<sub>2</sub> carbon credits for these renewable energy projects:

- (i) CO<sub>2</sub> emission per kWh of energy generation to be 1 kg (refer Table 1.4);
- (ii) Conversion rate of \$1 = Rs43.50; and
- (iii) CO<sub>2</sub> abatement value of Rs130,500 per million kg of CO<sub>2</sub>.

#### **D. Net Economic Benefits**

22. The net economic benefit is the difference between the economic benefits and the economic costs. The economic benefit was estimated using the following equation:

Net Economic Benefit = Economic Benefit – Economic Costs.

#### **E. Estimating Economic Internal Rate of Return**

23. EIRR was estimated based on the net economic benefits, which nets out all distortions, such as taxes, subsidies, depreciation, and tax benefits.

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<sup>a</sup> Source: The Energy and Resource Institute.

## FINANCIAL STATEMENTS

**Table A4.1: Trends in Operations of Indian Renewable Energy Development Agency Limited**  
(fiscal year ending 31 March)

Financial Year	Approvals of Loans	Disbursements of Loans	Collection Ratio	Gross NPA
	(Rs Million)	(Rs Million)	%	%
1990	58.3	49.2	96	—
1991	262.9	82.3	98	—
1992	248.4	101.9	99	—
1993	307.4	181.7	97	—
1994	1,623.9	559.2	97	—
1995	2,426.5	1,302.9	98	2
1996	6,049.1	2,384.7	83	4
1997	3,287.9	2,374.7	83	5
1998	4,989.6	1,872.6	81	22
1999	6,841.9	2,257.4	72	18
2000	9,284.9	4,292.6	75	17
2001	10,413.6	5,770.7	73	15
2002	6,983.6	6,077.0	74	11
2003	6,339.6	3,459.2	—	12
<b>Total</b>	<b>59,215.9</b>	<b>30,828.2</b>		

Source: Indian Renewable Development Agency Limited's Financial Statements.

**Table A4.2: Portfolio Analysis of Indian Renewable Energy Development Agency Limited**

Item	Gross Assets	Provisions	Net Assets	Percent to Total (gross)	Percent to Total (net)	Percent of Provisions and Write-Offs to Gross Assets
	(Rs million)	(Rs million)	(Rs million)			
<b>As of 31 March 1999</b>						
Standard Assets	6,138	—	—	82.48	—	—
Substandard Assets	973	—	—	13.07	—	—
Doubtful Assets	304	—	—	4.08	—	—
Loss Assets	27	—	—	0.37	—	—
<b>Total</b>	<b>7,442</b>	<b>270</b>	<b>7,172</b>	<b>100.00</b>	—	<b>3.62</b>
<b>As of 31 March 2000</b>						
Standard Assets	8,656	—	—	82.68	—	—
Substandard Assets	1,059	—	—	10.11	—	—
Doubtful Assets	727	—	—	6.95	—	—
Loss Assets	27	—	—	0.26	—	—
<b>Total</b>	<b>10,469</b>	<b>365</b>	<b>10,104</b>	<b>100.00</b>	—	<b>3.49</b>
<b>As of 31 March 2001</b>						
Standard Assets	12,628	32	12,597	85.06	87.82	0.25
Substandard Assets	1,359	136	1,223	9.15	8.53	10.00
Doubtful Assets	832	307	524	5.60	3.66	36.96
Loss Assets	27	27	0	0.18	0.00	100.00
<b>Total</b>	<b>14,846</b>	<b>502</b>	<b>14,344</b>	<b>100.00</b>	<b>100.00</b>	<b>3.38</b>
<b>As of 31 March 2002</b>						
Standard Assets	17,049	43	17,006	88.53	91.50	0.25
Substandard Assets	778	78	700	4.04	3.77	10.00
Doubtful Assets	1,431	552	879	7.43	4.73	38.56
Loss Assets	0	0	0	0.00	0.00	100.00
<b>Total</b>	<b>19,258</b>	<b>673</b>	<b>18,585</b>	<b>100.00</b>	<b>100.00</b>	<b>3.49</b>
<b>As of 31 March 2003</b>						
Standard Assets	17,911	45	17,866	87.86	91.31	0.25
Substandard Assets	630	63	567	3.09	2.90	10.01
Doubtful Assets	1,845	712	1,133	9.05	5.79	38.58
Loss Assets	0	0	0	0.00	0.00	100.00
<b>Total</b>	<b>20,386</b>	<b>820</b>	<b>19,566</b>	<b>100.00</b>	<b>100.00</b>	<b>4.02</b>

Source: Indian Renewable Development Agency Limited's Reports and Financial Statements.

**Table A4.3: Balance Sheet of Indian Renewable Energy Development Agency Limited**  
(fiscal year ending 31 March)  
(Rs million)

Item	1998	1999	2000	2001	2002	2003
<b>A. Liabilities</b>						
<b>1. Share Capital</b>						
a. Authorized Equity Shares	2,000	2,000	2,000	3,000	3,000	4,000
b. Issued, Subscribed and Paid Up Equity Shares	1,144	1,544	1,964	2,234	2,504	2,854
<b>Subtotal (1)</b>	<b>1,144</b>	<b>1,544</b>	<b>1,964</b>	<b>2,234</b>	<b>2,504</b>	<b>2,854</b>
<b>2. Reserves and Surplus</b>						
a. Capital Reserve (Grant-in-Aid)	722	760	874	998	1,007	1,007
b. Special Reserve Under Section 36(1)(viii)	133	239	337	428	428	518
c. NBFC Reserve as per RBI Norms	30	68	68	68	68	68
d. Debenture Redemption Reserve	177	177	177	177	177	177
e. General Reserve	0	1	28	78	78	314
f. Surplus	0	0	1	4	6	44
<b>Subtotal (2)</b>	<b>1,062</b>	<b>1,245</b>	<b>1,485</b>	<b>1,753</b>	<b>1,764</b>	<b>2,128</b>
<b>3. Capital Grants</b>	<b>14</b>	<b>24</b>	<b>17</b>	<b>76</b>	<b>91</b>	<b>101</b>
<b>4. Secured Loans</b>						
a. Bonds (Tax-Free)	2,960	3,860	4,360	4,610	4,610	4,810
b. Bank Loans						
i. Bank Loan under the Foreign Exchange Management	321	0	860	2,614	3,673	3,884
ii. Others	0	0	0	250	1,358	1,790
<b>Subtotal (4)</b>	<b>3,281</b>	<b>3,860</b>	<b>5,220</b>	<b>7,474</b>	<b>9,641</b>	<b>10,484</b>
<b>5. Unsecured Loans</b>						
a. Loans Guaranteed by the Government of India						
i. From ADB	788	844	1,123	2,332	2,737	4,625
ii. From KfW (Germany)	0	0	0	315	1,343	2,062
iii. IBRD	0	0	0	0	37	36
iv. LIC	75	0	0	0	0	0
b. Government Loans	1,328	2,130	2,466	3,055	4,152	4,219
<b>Subtotal (5)</b>	<b>2,191</b>	<b>2,974</b>	<b>3,589</b>	<b>5,702</b>	<b>8,269</b>	<b>10,942</b>
<b>6. Current Liabilities and Provisions</b>						
a. Current Liabilities	1,083	1,040	1,049	967	1,415	1,766
b. Provisions	173	360	396	369	452	572
<b>Subtotal (6)</b>	<b>1,256</b>	<b>1,400</b>	<b>1,445</b>	<b>1,336</b>	<b>1,867</b>	<b>2,338</b>
<b>Total</b>	<b>8,948</b>	<b>11,047</b>	<b>13,720</b>	<b>18,575</b>	<b>24,136</b>	<b>28,847</b>

ADB = Asian Development Bank, IBRD = International Bank for Reconstruction and Development, KfW = Kreditanstalt für Wiederaufbau, LIC = Life Insurance Corporation of India, NBFC = nonbank finance company, RBI = Reserve Bank of India.

Source: Indian Renewable Development Agency Limited's Financial Statements.

*Continued on next page*

Table A4.3 — Continued

Item	1998	1999	2000	2001	2002	2003
<b>B. Assets</b>						
<b>1. Fixed Assets</b>						
a. Gross Block	72	92	96	97	100	105
b. Depreciation Reserve	(30)	(41)	(52)	(60)	(66)	(70)
<b>Subtotal (1)</b>	<b>42</b>	<b>52</b>	<b>44</b>	<b>37</b>	<b>34</b>	<b>35</b>
<b>2. Investments</b>						
a. Quoted Government of India Securities	100	100	100	100	0	0
b. Unquoted Equity Securities	1	1	1	1	1	1
<b>Subtotal (2)</b>	<b>101</b>	<b>101</b>	<b>101</b>	<b>101</b>	<b>1</b>	<b>1</b>
<b>3. Cash and Bank Balances</b>						
a. Cash in Hand	0	0	0	0	0	0
b. Balances with Scheduled Banks						
i. In Current Account	118	170	231	100	326	138
ii. In Foreign Currency Account	55	59	0	0	0	0
iii. In Deposit Account						
Indian Rupees	938	1,593	1,065	346	35	476
Foreign Currency	796	850	1,117	2,641	4,137	6,741
iv. Cheques Under Collection	0	0	0	0	128	42
<b>Subtotal (3)</b>	<b>1,907</b>	<b>2,672</b>	<b>2,413</b>	<b>3,087</b>	<b>4,626</b>	<b>7,397</b>
<b>4. Interest accrued but not due</b>	<b>44</b>	<b>63</b>	<b>74</b>	<b>54</b>	<b>43</b>	<b>44</b>
<b>5. Loans</b>						
a. IREDA						
i. Considered Good and Fully Secured	—	—	—	11,958	17,099	18,538
ii. Considered Good but Secured by only Personal Guarantee	—	—	—	2,702	1,319	1,276
iii. Considered Doubtful	—	—	—	864	1,438	1,854
iv. Provisions	—	—	—	(476)	(637)	(784)
b. MNES						
i. Considered Good and Fully Secured	—	—	—	85	76	66
ii. Considered Good but Secured by only Personal Guarantee	—	—	—	47	32	48
iii. Considered Doubtful	—	—	—	69	69	66
c. Total						
i. Considered Good and Fully Secured	5,608	6,450	8,678	12,044	17,175	18,604
ii. Considered Good but Secured by only Personal Guarantee	1,190	1,561	1,935	2,750	1,352	1,325
iii. Considered Doubtful	135	332	757	933	1,507	1,920
iv. Provisions	(181)	(270)	(348)	(476)	(637)	(784)
<b>Subtotal (5)</b>	<b>6,752</b>	<b>8,073</b>	<b>11,022</b>	<b>15,251</b>	<b>19,397</b>	<b>21,065</b>
<b>6. Deferred Tax Asset</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>288</b>
<b>7. Miscellaneous Expenditure</b>	<b>102</b>	<b>85</b>	<b>66</b>	<b>45</b>	<b>33</b>	<b>17</b>
<b>Total</b>	<b>8,948</b>	<b>11,047</b>	<b>13,720</b>	<b>18,575</b>	<b>24,136</b>	<b>28,847</b>

IREDA = Indian Renewable Development Agency Limited, MNES = Ministry of Non-Conventional Energy.

**Table A4.4: Income Statement of Indian Renewable Energy Development Agency Limited**  
(fiscal year ending 31 March)  
(Rs million)

Item	1998	1999	2000	2001	2002	2003
<b>A. Income from Operations</b>						
1. Interest on Loans	679	906	1,088	1,337	2,011	2,289
2. Front-End Fee	26	28	55	68	61	38
3. Application Fee	1	2	3	3	3	3
4. Prepayment Premium	0	0	0	15	15	25
5. MNES Service Charges	5	4	3	1	1	1
<b>Subtotal (A)</b>	<b>711</b>	<b>940</b>	<b>1,149</b>	<b>1,424</b>	<b>2,091</b>	<b>2,356</b>
<b>B. Other Income</b>	<b>71</b>	<b>143</b>	<b>211</b>	<b>217</b>	<b>168</b>	<b>180</b>
<b>Total Income</b>	<b>782</b>	<b>1,083</b>	<b>1,360</b>	<b>1,641</b>	<b>2,259</b>	<b>2,536</b>
<b>C. Expenses</b>						
1. Personnel	20	29	30	41	46	48
2. Administrative and Others	39	23	30	52	39	45
3. Depreciation	9	11	12	8	6	6
4. Finances Charges						
a. Interest on Borrowings	534	611	820	1,062	1,519	1,834
b. Other Finance Charges	25	23	24	24	24	33
c. Commitment Fee	4	6	22	32	30	19
d. Government of India Guarantee Fee	1	5	4	12	25	42
5. Contribution to Exchange Risk Administration Fund	0	0	0	0	9	0
6. General Provision for Standard Assets	0	0	22	10	11	2
7. Provision for Bad and Doubtful Debts	117	89	79	128	161	147
8. Bad Debts	1	0	0	0	219	127
<b>Profit from Operations</b>	<b>32</b>	<b>286</b>	<b>317</b>	<b>272</b>	<b>170</b>	<b>233</b>
Add: Prior Period Income	3	(4)	(3)	1	1	(0)
<b>Profit before tax</b>	<b>35</b>	<b>282</b>	<b>314</b>	<b>273</b>	<b>171</b>	<b>233</b>
Tax	23	95	127	110	130	60
<b>Profit After Tax</b>	<b>12</b>	<b>187</b>	<b>187</b>	<b>163</b>	<b>41</b>	<b>173</b>
Balance in Previous Years	0	0	0	0	4	6
Excess Provisions	4	0	9	81	0	0
<b>Profit Available for Appropriations</b>	<b>16</b>	<b>187</b>	<b>196</b>	<b>244</b>	<b>46</b>	<b>179</b>
Special Provision (Section 36(1)(viii))	14	105	99	91	0	90
NBFC Reserves as per RBI Norms	2	37	0	0	0	0
Interim Dividend	0	0	40	0	0	0
Proposed Dividend	0	40	20	90	40	40
Dividend Tax and Surcharge	0	4	9	9	0	5
General Reserves	0	1	28	50	0	0
Surplus	0	0	0	4	6	44
<b>Total</b>	<b>16</b>	<b>187</b>	<b>196</b>	<b>244</b>	<b>46</b>	<b>179</b>

MNES = Ministry of Non-Conventional Energy, NBFC = nonbank finance company, RBI = Reserve Bank of India.  
Source: Indian Renewable Development Agency Limited's Financial Statements.

**Table A4.5: Funds Flow Statement of Indian Renewable Energy Development Agency Limited**  
(fiscal year ending 31 March)  
(Rs million)

Item	1999	2000	2001	2002	2003
<b>A. Sources of Funds</b>					
<b>1. Funds from Operations</b>					
Profit After Tax	187	187	163	41	173
Add: Depreciation	11	12	8	6	6
Miscellaneous Expenditure	17	18	21	12	16
Contribution to Exchange Risk Administration Fund	0	0	0	9	0
General Provision for Standard Assets	0	22	10	11	2
Provision for Bad and Doubtful Debts	89	79	128	161	147
Bad Debts	0	0	0	219	127
Deferred Tax Asset	0	0	0	0	(52)
Provisions for Dividends	(44)	(69)	(99)	(40)	(45)
Excess Provisions	0	9	81	0	0
<b>Subtotal (1)</b>	<b>260</b>	<b>258</b>	<b>312</b>	<b>419</b>	<b>374</b>
<b>2. Grants</b>					
a. Capital Reserve (Grant-in-Aid)	38	114	124	9	0
b. Capital Grants	9	(6)	59	14	11
<b>Subtotal (2)</b>	<b>47</b>	<b>108</b>	<b>183</b>	<b>23</b>	<b>11</b>
<b>3. Current Liabilities and Provisions</b>	<b>144</b>	<b>24</b>	<b>(119)</b>	<b>520</b>	<b>469</b>
<b>4. Secured Loans</b>					
a. Bonds (Tax-Free)	900	500	250	(0)	200
b. Bank Loans					
i. Bank Loan Under the Foreign Exchange Management	(321)	860	1,754	1,060	211
ii. Others	0	0	250	1,108	432
<b>Subtotal (4)</b>	<b>579</b>	<b>1,360</b>	<b>2,254</b>	<b>2,168</b>	<b>843</b>
<b>5. Unsecured Loans</b>					
a. Loans Guaranteed by the Government of India					
a. From ADB	56	279	1,210	405	1,888
b. From KfW (Germany)	0	0	315	1,029	719
c. IBRD	0	0	0	37	(1)
d. LIC	(75)	0	0	0	0
b. Government Loans	804	335	587	1,095	67
<b>Subtotal (5)</b>	<b>785</b>	<b>614</b>	<b>2,112</b>	<b>2,566</b>	<b>2,673</b>
<b>6. Equity</b>	<b>400</b>	<b>420</b>	<b>270</b>	<b>270</b>	<b>351</b>
<b>Total</b>	<b>2,215</b>	<b>2,784</b>	<b>5,012</b>	<b>5,966</b>	<b>4,721</b>

ADB = Asian Development Bank, IBRD = International Bank for Reconstruction and Development, KfW = Kreditanstalt für Wiederaufbau, LIC = Life Insurance Corporation of India.

Source: Based on Indian Renewable Development Agency Limited's Financial Statements.

*Continued on next page*

Table A4.5 — Continued

Item	1999	2000	2001	2002	2003
<b>B. Application of Funds</b>					
1. Fixed Assets	21	4	2	3	7
2. Investments	0	0	0	(100)	0
3. Loans	1,410	3,028	4,356	4,535	1,942
4. Interest Accrued but not Due	19	11	(20)	(11)	1
<b>Total</b>	<b>1,450</b>	<b>3,043</b>	<b>4,338</b>	<b>4,427</b>	<b>1,950</b>
<b>Increase/ (Decrease) in Cash and Bank Balances</b>	<b>765</b>	<b>(259)</b>	<b>674</b>	<b>1,539</b>	<b>2,771</b>
Closing Cash and Bank Balance	2,672	2,413	3,087	4,626	7,397
Opening Cash and Bank Balance	1,907	2,672	2,413	3,087	4,626
<b>Difference</b>	<b>765</b>	<b>(259)</b>	<b>674</b>	<b>1,539</b>	<b>2,771</b>



**Table A4.6: Ratio Analysis of Indian Renewable Energy Development Agency Limited**  
(fiscal year ending 31 March)

Item	1998	1999	2000	2001	2002	2003
Net Profit Ratio before Provisions and Write-Offs (%)	16.30	25.85	21.41	18.25	19.49	17.70
Net Profit Ratio after provisions and Write-Offs (%)	1.19	17.63	14.02	9.87	1.77	6.83
Profit after Tax to Average Networth (%)	0.47	7.88	6.23	4.37	0.96	3.69
Profit after Tax to Average Assets (%)	0.12	1.93	1.55	1.01	0.19	0.65
Intermediation Cost Ratio (%)	0.73	0.52	0.49	0.58	0.40	0.35
Earnings per Share (Rs)	8.16	123.74	97.16	72.53	15.99	60.70
Debt-Equity Ratio	—	2.50	2.59	3.34	3.28	3.53
Debt Service Coverage Ratio (%)	—	1.85	2.47	1.70	1.43	1.64
Capital Adequacy Ratio (%)	—	—	—	26.79	22.55	23.80
Gross Nonperforming Assets (%)	—	17.52	17.32	14.94	11.47	12.14
Net Nonperforming Assets (%)	—	—	—	12.18	8.50	8.69

% = Percent.

Sources: Based on Indian Renewable Development Agency Limited's Financial Statements and Auditors' Certificate

### STATUS OF COMPLIANCE WITH MAJOR LOAN COVENANTS

Covenant	Reference in Loan Documents	Remarks
Indian Renewable Energy Development Agency Limited (IREDA) shall carry out the Project with due diligence and efficiency and in conformity with sound banking, administrative, financial, engineering, social, environmental and business practices	LA, Sec. 5.01(a)	Complied with.
Except as Asian Development Bank (ADB) and IREDA may otherwise agree, IREDA shall not substantially amend the Memorandum and Articles and the Operational Policy Statement	LA, Sec. 5.01(c)	Complied with.
IREDA shall at all times make adequate provisions to protect itself against any loss resulting from changes in the rate of exchange between Rupees and the currency or currencies in which IREDA's outstanding money obligations will have to be met.	LA, Sec. 5.02	Complied with.
IREDA shall ensure that all local-currency funds, including local-currency funds provided from the Loan proceeds, and other resources, which are required by Qualified Enterprises for the carrying out of their respective Qualified Projects shall be available to such Qualified Enterprises promptly as needed.	LA, Sec. 5.03	Complied with.
IREDA shall maintain records and accounts adequate to record the progress of each Qualified Project (including the cost thereof) and to reflect, in accordance with consistently maintained sound accounting principles, the operations and financial condition of IREDA.	LA, Sec. 5.04	Complied with.
IREDA shall furnish to ADB all such reports and information as ADB shall reasonably request concerning (i) the Loan, the expenditure of the proceeds and maintenance of the service thereof; (ii) the Project; (iii) the Qualified Enterprises, the Qualified Projects and the subloans; (iv) the administration, operations and financial condition of IREDA; and (v) any other matters relating to the purposes of the Loan.	LA, Sec. 5.05 (a)	Complied with.

Covenant	Reference in Loan Documents	Remarks
<p>Without limiting the generality of the foregoing, IREDA shall furnish to ADB quarterly reports on the execution of the Project and on the operation and management of IREDA. Such reports shall be submitted in such form and in such detail and within such a period as ADB shall reasonably request, and shall indicate, among other things, progress made and problems encountered during the quarter under review, steps taken or proposed to be taken to remedy these problems, and proposed program of activities and expected progress during the following quarter.</p>	LA, Sec. 5.05 (b)	Complied with.
<p>Promptly after the closing date for withdrawals from the Loan Account, but in any event not later than 6 months after the said closing date or such later date as may be agreed for this purpose between ADB and IREDA, IREDA shall prepare and furnish to ADB a report, in such form and in such detail as ADB shall reasonably request, on the utilization of the Loan, the execution of the Qualified Projects, their costs, the performance by IREDA of its obligations under the Loan Agreement and the accomplishment of the purposes of the Loan.</p>	LA, Sec. 5.05 (c)	Complied with.
<p>IREDA shall have its accounts and financial statements (balance sheet, statement of income and expenses, and related statements) audited annually, in accordance with appropriate auditing standards consistently applied, by independent auditors whose qualifications, experience and terms of reference are acceptable to ADB; and shall, promptly after their preparation but in any event not later than 9 months after the close of the fiscal year to which they relate, furnish to ADB (i) certified copies of such audited accounts and financial statements and (ii) the report of the auditors relating thereto (including the auditors' opinion on the use of the Loan proceeds, imprest account and SOE procedure as well as compliance with the covenants of this Loan Agreement), all in the English language. IREDA shall furnish to ADB such further information concerning such accounts and financial statements and the audit thereof as ADB shall from time to time reasonably request, including the quality classification of IREDA's assets, adequacy of IREDA's provision for bad and doubtful debts, and capital adequacy ratio of IREDA.</p>	LA, Sec. 5.06 (a)	Complied with.

Covenant	Reference in Loan Documents	Remarks
IREDA shall enable the ADB, upon ADB's request, to discuss IREDA's financial statements and its financial affairs, from time to time, with IREDA's auditors and shall authorize and require any representative of such auditors to participate in any such discussions requested by ADB, provided that any such discussion shall be conducted only in the presence of an authorized officer of IREDA, unless IREDA shall otherwise agree.	LA, Sec. 5.06 (b)	Complied with.
IREDA shall enable ADB's representatives to inspect any qualified enterprise, any qualified project, any goods financed out of the proceeds of the loan, and any relevant records and documents maintained by IREDA.	LA, 5.07	Complied with.
IREDA shall, promptly, as required, take all action within its powers to maintain its corporate existence; carry on its operations; and acquire, maintain, and renew all rights, properties, powers, privileges, and franchises that are necessary in the carrying out of the Project or in conduct of its business.	LA, Sec. 5.08 (a)	Complied with.
IREDA shall, at all times, conduct its business in accordance with sound administrative, financial, environmental, and business practices, under the supervision of competent and experienced management and personnel.	LA, Sec. 5.08 (b)	Complied with.
Except as ADB and IREDA may otherwise agree, IREDA shall not acquire or sell, lease, or otherwise dispose of any of its assets, except in the ordinary course of its business.	LA, Sec. 5.08 (c)	Complied with.
Except as ADB and IREDA may otherwise agree, IREDA shall maintain a ratio of the consolidated debt of IREDA and all its subsidiaries, if any, to the consolidated equity of IREDA and all its subsidiaries not higher than 4:1.	LA, 5.09	Complied with.
Except as ADB may otherwise agree, IREDA shall undertake its operations and require any subsidiaries to operate so as to ensure that the consolidated internal cash generation for debt service for each fiscal year shall be at least 1.5 times the consolidated debt service requirement for that fiscal year.	LA, 5.10	Complied with, except for FY2002, when it was 1.43.

Covenant	Reference in Loan Documents	Remarks
Except as ADB and IREDA may otherwise agree, IREDA shall not (i) take, or cause to be taken, any action that would have the effect of amending, abrogating, assigning, or waiving any provision, right, or obligation of IREDA, under the Guarantor's loan agreements, or (ii) repay any portion of the Guarantor's loans in advance of maturity.	LA, Sec 5.11	Complied with.
IREDA shall cause each of its subsidiaries, if any, to observe and perform the obligations of IREDA under this Loan Agreement, to the extent to which such obligations may be applicable thereto, as though such obligations were binding upon each of such subsidiaries.	LA, Sec 5.12	Not applicable.
IREDA undertakes that, except as ADB and IREDA may otherwise agree, (i) if IREDA or any subsidiary, if any, shall create any lien on any of its assets as security for any debt, such a lien will ipso facto equally and ratably secure the payment of the principal of, and interest and other charges on, the loan and IREDA, in creating or permitting the creation of any such lien, will make express provision to that effect; and (ii) if any statutory lien shall be created on any assets of IREDA, or any subsidiary, as security for any debt, IREDA shall grant to ADB an equivalent lien satisfactory to ADB.	LA, Sec 5.13 (a)	Complied with.
IREDA shall select and appraise proposed qualified projects in the technological areas.	LA, Sch. 4, para 1	Complied with.
Feasibility studies must confirm the economic and financial acceptability of the proposed qualified project (an economic internal rate of return of at least 12% and a financial internal rate of return normally exceeding the cost of capital in real terms).	LA, Sch. 4, para 2(a)	Financial appraisal was carried out. EIRR estimates were not made, although they were assessed to be in the range of 12% to 39%.
A qualified enterprise shall contribute out of its own resources a minimum of 25% of the total cost of the qualified project, except for solar-thermal, which was amended to 15%.	LA, Sch. 4, para 2(b)	Complied with.

Covenant	Reference in Loan Documents	Remarks
The qualified enterprise shall be financially sound, as demonstrated by the ability to mobilize its required domestic resources for its investment programs, to make adequate debt service and amortization payments and to maintain a debt service coverage ratio and a debt-equity ratio, as stipulated in IREDA's selection criteria.	LA, Sch. 4, para 2(c)	Complied with.
Each qualified project shall meet all local and national environmental and safety standards.	LA, Sch. 4, para 2(d)	Complied with.
IREDA shall ensure that each qualified enterprise will therefore be required to prepare an initial environmental examination (IEE) or an environmental impact assessment (EIA), including their summaries, as provided by the relevant environmental guidelines of the Guarantor or ADB's <i>Environmental Assessment Requirements</i> and <i>Environmental Review Procedures of the ADB</i> . A qualified enterprise will be required by IREDA to secure approvals, if any, from the relevant environmental authorities, including the Ministry of Environment and Forests (MOEF), of the Guarantor and the relevant state pollution control board.	LA, Sch. 4, para 3	IEEs were submitted for most of the large cogeneration projects, and IREDA certified adherence to the loan requirements in that regard. Wind projects were assessed to have no negative environmental impact, and therefore no IEE was submitted to ADB. Selective due diligence during the Review Mission revealed that subprojects obtained required clearances from local authorities for project commencement, construction, and operation.
For a qualified project costing \$10,000,000 or more or if required by MOEF, IREDA shall cause the qualified enterprise to submit evidence of compliance with the mitigating measures and environmental requirements identified in the EIA prior to completion of construction of the qualified project.	LA, Sch. 4, para 4	Complied with national and local laws.

Covenant	Reference in Loan Documents	Remarks
IREDA shall establish a suitable mechanism, including institutional development, to (i) assist qualified enterprises in preparation of the EIAs required under ADB's <i>Environmental Assessment Requirements</i> and <i>Environmental Review Procedures of the ADB</i> or any regulation of the Guarantor; (ii) monitor approval and issuance of no-objection certificates by the environmental regulatory authorities concerned; and (iii) liaise with ADB for ex post facto environmental review of each qualified project.	LA, Sch. 4, para 5	IREDA did not have the capacity to advise the subborrowers, who had appointed independent experts for the preparation of IEEs and the environmental management plan. While IREDA conducts due diligence to ensure that the subprojects obtain requisite clearances from the authorities, processes and mechanisms to track such information and document it in a systematic manner should be put in place.
In respect of each qualified project, IREDA shall submit to ADB for review, on an ex post facto basis, a short report, checklist, IEE, EIA, or their summaries, as may be appropriate.	LA, Sch. 4, para 6(a)	IREDA submitted information on ADB's specific request.
ADB, at its discretion, may review the IEE, summary IEE, EIA, or summary EIA for any qualified project.	LA, Sch. 4, para 6(b)	Complied with.
In the event of IREDA becoming aware of a qualified project being in violation of any environmental law or regulation, a report will be submitted to ADB evidencing that the environmental authority concerned has taken action or will take action to rectify the violation.	LA, Sch. 4, para 7	No such project was identified by IREDA.

Covenant	Reference in Loan Documents	Remarks
IREDA shall provide to ADB a report on benefit monitoring and evaluation for each qualified project during the first 5 years of its full operation, to enable an evaluation to be made of each qualified project. Such report shall include assessment, on the basis of baseline data agreed to by ADB, of (i) results achieved, encompassing physical efficiency of operations (specifically improvement in operational efficiency and reduction in consumption of material and energy and industrial pollution); and (ii) compliance with applicable environmental standards.	LA, Sch. 4, para 8	IREDA regularly submitted a quarterly progress report but did not submit detailed information on subproject benefits at regular intervals, although it provided information at ADB's request and during review missions.
IREDA, within 18 months of the date of this Loan Agreement, shall take steps to enable representation on its Board of Directors of a financial institution and the private sector.	LA, Sch. 4, para 9	Complied with, after a delay of 2.5 years.

ADB = Asian Development Bank, IREDA = Indian Renewable Energy Development Agency Limited.



## DETAILS OF SUBPROJECT VISITS

Subloan Number	Subborrower Description	Date of the visit
<b>Bagasse-Based Cogeneration Power Plants</b>		
A01	Shamanur Sugars Limited	9 February 2004
A07	Prabhulingeswar Sugar Works Limited	10 February 2004
A08	Jamkhandi Sugars Limited	11 February 2004
A44	Arunachalam Sugars Limited	10 February 2004
A60	Supreme Renewable Energy Limited	11 February 2004
<b>Wind Based Power Plants</b>		
003	Ushdev International Limited	12 February 2004
A09	BF Utilities Limited	9 February 2004
A11	Enercon Winds Farms (India) Limited	10 February 2004
A42	Tata Finance Limited	10 February 2004
A53	Windia Power Limited	9 February 2004

Source: correspondence with ICRA Limited.

**SITE PHOTOGRAPHS**



**Wind Farm in Satara District, Maharashtra**



**Wind Farm in Satara District, Maharashtra**



**View of Cogeneration Plant in Sugar Mill**



**Fly Ash being collected**



**Electrostatic Precipitator in a Cogeneration Plant**



**Bagasse Feeder in a Cogeneration Plant**



**A Solar Thermal Unit – Domestic Premises**



**A Solar Thermal Unit – College Hostel**