Grant Assistance Report

Project Number: 40001
May 2006

Grant Assistance
Kingdom of Bhutan: Rural Electricians Training Program
(Financed by the Japan Fund for Poverty Reduction)

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 18 May 2006)

Currency Unit	–	ngultrum (Nu)
Nu1.00	=	$0.0221
$1.00	=	Nu45.23

ABBREVIATIONS

ADB	–	Asian Development Bank
BC	–	Barefoot College
DHR	–	Department of Human Resources
DOE	–	Department of Energy
JICA	–	Japan International Cooperation Agency
NTTA	–	National Technical Training Authority
PMU	–	project management unit
PV	–	photovoltaic
RE	–	rural electrification
SC	–	Steering Committee

WEIGHTS AND MEASURES

cct-km (circuit kilometer)	–	unit of transmission or distribution line lengths
kV (kilovolt)	–	1,000 volts
kW (kilowatt)	–	1,000 watts
MW (megawatt)	–	1,000,000 watts

NOTES

(i) The fiscal year of the Government of Bhutan ends on 30 June.
(ii) In this report, "$" refers to US dollars.

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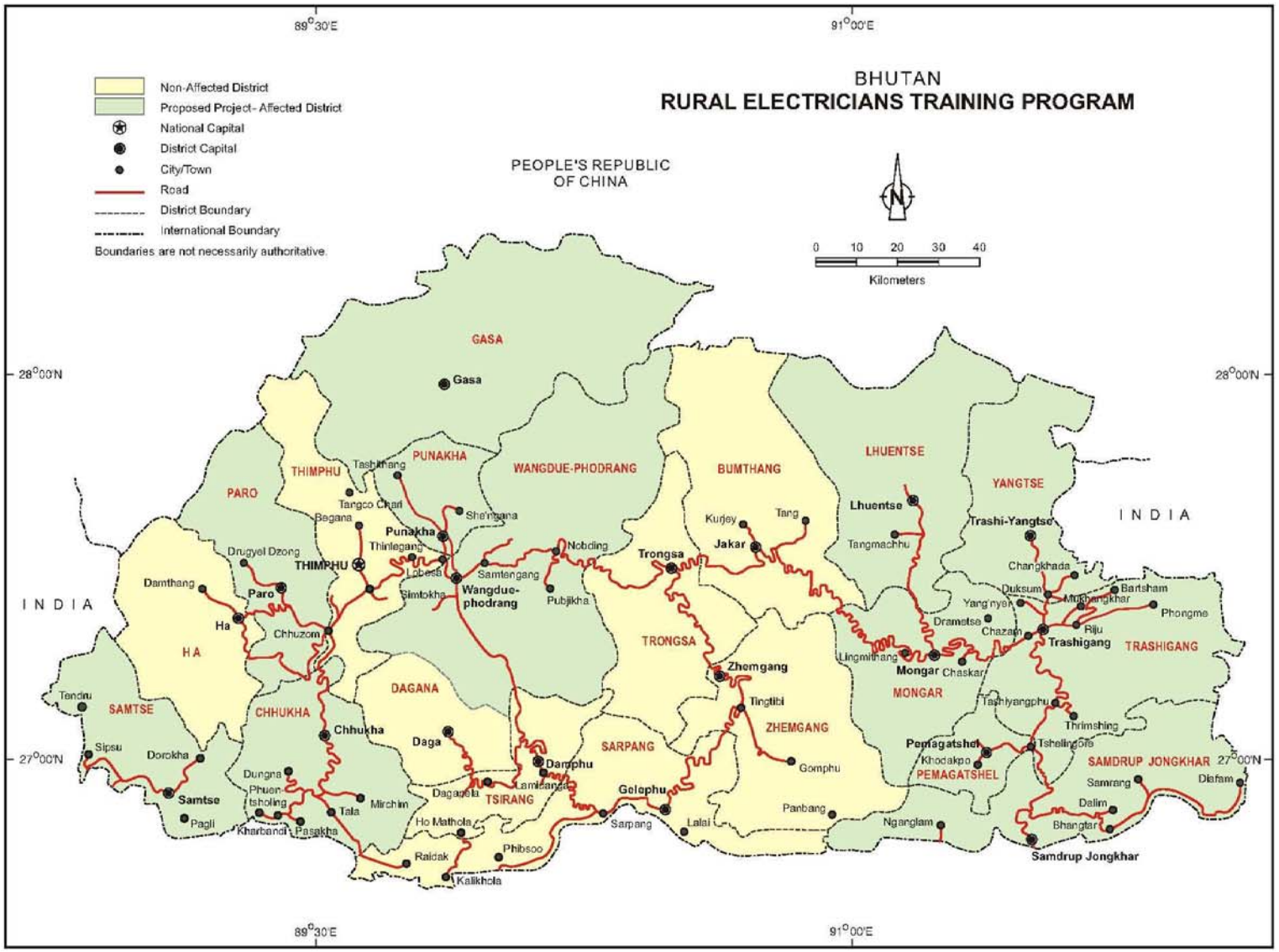

BHUTAN
RURAL ELECTRICIANS TRAINING PROGRAM
Non-Affected District
Proposed Project- Affected District
National Capital
District Capital
City/Town
Road
District Boundary
International Boundary
Boundaries are not necessarily authoritative.
PEOPLE'S REPUBLIC OF CHINA
INDIA
INDIA
N
0 10 20 30 40
Kilometers
89°30'E
91°00'E
28°00'N
27°00'N
GASA
Gasa
PUNAKHA
WANGDUE-PHODRANG
BUMTHANG
LHUENTSE
YANGTSE
THIMPHU
PARO
HA
SAMTSE
CHHUKHA
DAGANA
TSIRANG
SARPANG
TRONGSA
ZHEMGANG
MONGAR
PEMAGATSHEL
TRASHIGANG
SAMDRUP JONGKHAR
Tashithang
Punakha
Tangco Chari
Begana
She'ngana
Thintegang
Lobesa
Simtokha
Wangdue-phodrang
Samtengang
Pubjikha
Nobding
Trongsa
Kurjey
Tang
Jakar
Lhuentse
Tangmachhu
Trashi-Yangtse
Changkhada
Duksum
Bartsham
Yang'nyer
Mukhengkhar
Phongme
Dramitse
Chazam
Riju
Trashigang
Lingmithang
Mongar
Chaskar
Tashiyangphu
Thrimshing
Pemagatshel
Tshelingkha
Khodakpo
Samrang
Dalim
Bhangtar
Samdrup Jongkhar
Diafam
Ngangla
Panbang
Gomphu
Zhemgang
Tingtibi
Gelephu
Sarpang
Lalai
Damphu
Lamidanda
Daganela
Ho Mathola
Phibsoo
Raidak
Kalikhola
Daga
Chhukha
Dungna
Phuen-tsholing
Mirchim
Tala
Kharbandi
Pasakha
Samtse
Pagli
Sipsu
Dorokha
Tendru
Ha
Paro
Damthang
Chhuzom
Drugyel Dzong
THIMPHU

05-4532 HR

JAPAN FUND FOR POVERTY REDUCTION (JFPR)

JFPR Grant Proposal

I. Basic Data	
Name of Proposed Activity	Rural Electricians Training Program
Country	Bhutan
Grant Amount Requested	$1 million
Regional Grant	○Yes / ● No
Grant Type	● Project / ○ Capacity building

II. Grant Development Objective(s) and Expected Key Performance Indicators

Grant Development Objectives:

The main purpose of the proposed Project is to reduce rural poverty by creating employment opportunities. Component A will provide training for local villagers to become electricians. Trained electricians will meet the growing demand in rural areas, as well as ensure that household wiring is done properly and safely. Component B will provide a unique training package, which includes the installation of photovoltaic (PV) solar systems in communities that are not going to be connected to the grid in the next 10–15 years. In addition to creating job opportunities for solar electricians, this component will have a major positive impact on isolated communities that otherwise would become more marginalized. They will enjoy the benefits from access to electricity. In particular, the proposed Project will target communities where traditional activities such as pottery, silversmithing, etc., are dying due to lack of opportunities.

Expected Key Performance Indicators:

(i) Income of trained rural electricians.
(ii) Income growth in electrified villages under the Project.
(iii) Number of new businesses in electrified villages under the Project.
(iv) Number of accidents in households due to wiring.
(v) Number of hours devoted to study in electrified villages under the Project.

III. Grant Categories of Expenditure, Amounts, and Percentage of Expenditures

Category	Amount of Grant Allocated in $	Percentage of Expenditures
1. Equipment and Supplies	361,535	36.1
2. Training, Workshop, and Public Campaign	386,070	38.6
3. Grant Management	27,000	2.7
4. Consulting Services	32,690	3.3
5. Other Inputs		
a. Nongovernment Organization Fees	69,000	6.9
b. Rural Electronic Workshops	37,950	3.8
c. Database Development	18,000	1.8
6. Contingencies	67,755	6.8
TOTAL	**1,000,000**	**100.0**
Incremental Cost	0	0

JAPAN FUND FOR POVERTY REDUCTION

JFPR Grant Proposal
Background Information

A. Other Data

Date of Submission of Application	15 November 2005
Project Officer	Ilaria Caetani, Social Development Specialist
Project Officer's Division, E-mail, Phone	SAEN, icaetani@adb.org, (632) 632 6274
Other Staff Who Will Need Access to Edit or Review the Report	Melinda Platon
Sectors	Energy, education
Subsectors	Renewable energy generation, nonformal education
Theme	Sustainable economic growth
Subtheme	Developing rural areas
Targeting Classification	Targeted Intervention
Name of Associated ADB-Financed Operation(s)	Loan 2009-BHU (ADF): Rural Electrification and Network Expansion
Executing Agency	Department of Energy Ministry of Trade and Industry
Grant Implementing Agencies	1. Tsering Tobgay Department of Human Resources, Ministry of Labor Thimphu, Bhutan E-mail: ttobgay@druknet.bt Phone: (975) 2 327337 Fax: (975) 2 324846 2. Satchi Officiating Head, Renewable Energy Division Department of Energy/Renewable Energy Division Thimphu, Bhutan E-mail: Satchi@druknet.bt Phone: (975) 2 328279 Fax: (975) 2 328278

B. Details of the Proposed Grant

1. Description of the Components, Monitorable Deliverables/Outcomes, and Implementation Timetable

Component A	
Component Name	Training as rural electricians in newly electrified villages
Cost ($)	569,368 (JFPR: 444,368, Government: 125,000), excluding contingencies

Component Description	Component A comprises four subcomponents: (i) Informal vocational training for semiliterate villagers as rural electricians. (ii) Sensitization on new opportunities deriving from electrification in affected villages. (iii) Development of a rural electrician's database. (iv) Dissemination of results. With the support of the Asian Development Bank (ADB), through the JFPR cofinancing scheme, the Department of Human Resources (DHR) is going to develop an informal training program to integrate the village skills development programs, which the Ministry of Labor has been implementing on a smaller scale. This program will be extended to all villages that were electrified recently under the Rural Electrification and Network Expansion Project.[1] Training will be carried out directly at the *Gewog* level and will last up to 2 months. DHR is expected to provide the in-house and contracted trainers. The trainers will be selected in accordance with ADB's *Guidelines on the Use of Consultants* and other arrangements satisfactory to ADB for the engagement of domestic consultants. At the same time, DHR will consult with newly electrified villages to make the population aware of the range of opportunities that access to electricity can bring. Rural populations are aware of improvements in health care, education, and productivity due to electrification, though new opportunities for entrepreneurial activities and diversification do not seem to be appreciated right away. *Dzongkhags* (districts), *Gewogs* and villages are to be selected for the Project based on expected electrification. Priority will be given to villages that are going to be electrified under the ADB loan and rural electrification program in June 2006. A list has been drafted. DHR will be responsible for selecting suitable candidates for the training based on three main criteria. Trainees (i) must be adults, preferably middle-aged or women, who are likely to be more attached to the village; (ii) should have at least 5 years of education, but no more than 7 years; and (iii) preferably should be nonformal education learners. The training modules, which will be carried out at the *Gewog* level, will be divided into two submodules: (i) 3 weeks of basic training, and (ii) 5 weeks of workplace training. At the end of 8 weeks, the competency of the trainees will be assessed. In addition, DHR will provide the trainees with a tool kit that can be used during and after the training.
Monitorable Deliverables/Outputs	(i) Provide 395 semiliterate villagers, in 79 *Gewogs* in 12 *Dzongkhags*, with training and certifications as rural

[1] ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grants to Bhutan for the Rural Electrification and Network Expansion.* Manila (Loan 2009-BHU, approved on 9 September 2003)

	electricians, leading to the creation of new income-generating activities. Graduated trainees also will serve as training assistants for the next batches. (ii) Wire about 10,500 households safely. (iii) Create a database of graduated electricians throughout the country at the *Dzongkhag* level. (iv) Increase awareness in newly electrified villages on increased benefits and income-generating opportunities due to electrification. (v) Increase training capacity of DHR.
Implementation of Major Activities: Number of months for grant activities	Months 1–20 for training in 79 *Gewogs* Months 21–24 for analysis of results, dissemination, and workshop

Component B	
Component Name	Installation of PV solar systems and training for wiring, installation, maintenance, and spare parts construction in off-grid villages
Cost ($)	680,632 (JFPR: 555,632; Government: 125,000), excluding contingencies
Component Description	Component B comprises three subcomponents: (i) Training as solar engineers and installation of PV solar systems. (ii) Sensitization on new opportunities derived from electrification in affected villages. (iii) Dissemination of results. With ADB's support, through JFPR cofinancing scheme, Department of Energy (DOE), through the consultant under this component, will select at least 23 villages in the most remote areas in Bhutan, and at least 46 trainees. Priority will be given to those villages where artisan activities of cultural interest risk disappearing due to lack of opportunities. DHR will review a feasible way to support the trade of these products. The Barefoot College (BC) will implement the second component, according to its previously successful approach, in agreement with ADB. The selection also will be based on the results in the Rural Electrification Master Plan, financed by Japan International Cooperation Agency (JICA). BC will be selected as consultant for this component through direct hiring. BC is a globally known nongovernment organization. Started 34 years ago in the village of Tilonia in Rajasthan, India, BC is the only college built by the poor for the poor. The objective of the college is to identify and recognize traditional knowledge, village skills, and practical wisdom of the poor, and apply

	them for their own development. BC believes that illiteracy is not a barrier to acquiring skills and enabling the poor to develop themselves. Any illiterate or semiliterate rural man or woman, given the opportunity and the mental and physical space to develop themselves at their own pace, have the capacity and competence to be “barefoot” doctors, teachers, solar and water engineers, and architects. BC is also the only fully solar powered college in India—45 kilowatt (kW) of solar panels provide power to run 20 computers, E-mail, 500 tube lights, 70 fans, photocopying machine, VCRs, camcorders, editing machine, slide projectors, and battery charger. The concept of the “barefoot” approach has been replicated in 13 states in India, and in five other developing countries around the world (Afghanistan, Ethiopia, Nepal, Senegal, and Sierra Leone). DHR has supported strongly the selection of BC as the consultant for this component and its involvement in the design and implementation of the proposed Project. Once the non-electrified village has been identified, the first step is to consult with the entire village to define two key issues in a participatory way. First, when the solar units come, an assessment must be made as to how much households are willing to pay for the repair, maintenance, and replacement of spares. The baseline usually used to determine the willingness to pay is the equivalent of the household expense for alternative sources of energy, i.e., kerosene or royalty for wood. Second, at least one person (preferably a woman) who has roots in the village and has no interest in migrating to the cities must be selected. The trainee (i) must be semiliterate (less than class 7 of the Bhutanese education system, which is the minimum requirement to access public employment); (ii) preferably should be middle-aged; (iii) can be physically challenged; and (iv) must be from one of the poorest families. The person selected has to sign a contract with the community of origin to provide services, once trained, as a barefoot solar engineer (BSE) for at least 5 years. The trainee then agrees to attend 6 months of hands-on practical training at BC in India. During the training, the BSE is trained on the fabrication of charge controllers and invertors, core winding, printed circuit boards, testing the quality, wiring the houses, installation of the solar panels, and repair and maintenance. When the BSE returns to his or her village, the first assignment is to establish a rural electronic workshop (REW). This will enable the BSE to carry out instant repairs and normal maintenance work at the village level. Once the materials are ready, the BSE will install the solar panels in each household in the presence of the households in the village.

	To qualify for selection, villages (i) must be remote and non-electrified; (ii) shall not be covered by the conventional grid over the next 10–15 years; and (iii) preferably should be off-grid "heritage" villages, where traditional skills in carpentry, blacksmith, painting, and weaving are under threat. The average number of households for villages in marginalized rural areas is 15. The Project is designed to include all the households in each selected village. Component B will be implemented on a turnkey basis since the barefoot approach provides a comprehensive package that includes soft (training) and hard (materials, panels, etc.) elements. To improve implementation of this component, DOE and DHR have suggested that their staff might benefit from a field mission to Tilonia or any other BC branch in the area. This would build capacity of both institutions, and would ensure a better understanding of the barefoot approach. As no land acquisition or other resettlement issues are expected, involuntary resettlement category is C.
Monitorable Deliverables/Outputs	(i) Provide sustainable and clean electricity to at least 23 isolated villages that are not likely to be connected to the grid in the next 10–15 years. (ii) Provide PV solar systems and wiring to a maximum of 345 households (based on an average of 15 households per village). (iii) Train 46 semiliterate villagers as BSEs, leading to the creation of new income-generating activities. (iv) Provide means to villages with traditional cultural and economic activities to revitalize heritage artisanship that is at risk of extinction. (v) Establish at least 18 REWs to provide, build, and install spare parts and maintenance at village level.
Implementation of Major Activities: Number of months for grant activities	Months 1–2 for selection of villages Months 3–10 for training Months 11–20 for installation and establishment of REWs Months 21–24 for analysis of results, dissemination, and workshop

2. Financing Plan for Proposed Grant to be Supported by JFPR

Funding Source	**Amount** ($)
JFPR	1,000,000
Government	250,000
Other Sources	
Total	**1,250,000**

3. Background

1. ADB has been an important partner for Bhutan in the development of the power sector. In 2001, ADB and the Government signed a poverty partnership agreement, which gave specific attention to providing electricity to the 30% of the population living in poverty. Focus group discussions and surveys based on previous projects indicate that beneficiaries attribute considerable improvement in their quality of life to electrification. By expanding opportunities for families to increase productivity and diversify their economic activities, access to electricity can generate additional income in rural areas where poverty is linked to a lack such opportunities. Education, electrification, and vocational training are perceived as major elements that can help reduce poverty.

2. At the same time, Bhutan faces a shortage of skilled labor, particularly in rural areas. Newly electrified households need skilled electricians to wire and maintain them safely. The National Technical Training Authority (NTTA), now DHR, has been trying to address the problem by developing formal training (which lasts for up to 2 years) in two specialized centers, and vocational training at the village level (which lasts 2–3 months and is mainly practical). Formal training seems to be unsuitable for rural beneficiaries due to the location, the length, and the minimum educational requirements. Meanwhile, vocational training at the village level, although successful, has not been provided on the scale needed throughout the country.

3. In light of these factors, and the major role ADB played in energy, DOE asked ADB to explore financing a project to train rural electricians, as an income-generating activity, in areas covered by ADB's RE projects. DOE also requested ADB to consider off-grid alternative sources of energy for the most remote areas.

4. In Bhutan, agriculture and agriculture-related activities account for 32.7% of gross domestic product (GDP). Moreover, 73.1% of the population is employed, mainly as unskilled labor, in the agriculture sector. Of those workers, 74.1% have no formal education. The productivity of rural labor, therefore, is low. The lack of education and training can lead to an endemic exposure to poverty. These factors mainly result in lack of opportunities for rural labor to develop alternative and/or additional sources of income and better living standards.

5. The energy sector in Bhutan accounts for about 11% of GDP, and provides the Government with 45% of its revenue. By the end of 2025, the percentage is expected to increase after the commissioning of Tala Hydro-Power Plant. Most of Bhutan's power comes from run-of-the-river hydropower. Almost 80% of the generated electricity is exported, mainly to India. Given the current situation, the Government has prioritized the development of the country's hydropower potential for exporting, and as an essential source for economic growth and development with minimal environmental impacts.

6. The rural electrification (RE) system has outpaced the extension of the road network. As a result, the marginal cost of grid extension and household connection is increasing constantly. Connection cost is between $1,500 and $2,000 per household, and is likely to increase as RE reaches even more remote villages and households. This will affect the technical and economic viabilities of future grid extension. As such, DOE is exploring ways to use off-grid forms of renewable energy for RE.

7. To achieve its goal of electrifying the entire country by 2020, the Government urgently must consider alternatives to traditional on-grid electrification. As RE is reaching out to more remote areas, the grid will not be a cost-efficient option for some very isolated villages or households. As such, DOE is becoming interested in sources of renewable energy that can reach the farther villages. Solar systems and community-based hydropower facilities are being

piloted. The Government has been promoting pilot solar electrification in Bhutan for a few years. However, the pilot project has not been as successful as hoped. The recipient community seems to lack a sense of ownership, because it has not been actively involved in the process, maintenance, and technical know-how.

8. A detailed survey, conducted as part of the RE master plan, identified the villages and houses across Bhutan that could be covered by solar PV. The survey indicated that about 250 villages (3,300 households) could be solar electrified, provided a new cost-effective, community-based approach could be tried on a small scale.

9. In addition, DHR (formerly NTTA) wants electrification to reach villages where traditional handicrafts are manufactured, and a lack of opportunities is jeopardizing their survival. Access to electricity is expected to revitalize those activities by introducing new technologies and improving life standards of artisans, providing incentives for new generations to cultivate the local heritage.

4. Innovation

10. The proposed Project aims to reduce poverty in rural areas with a multidimensional approach. Poverty is a multidimensional problem, linked mostly to a lack of opportunities. This might be related to scarce sanitation and poor health care or education. It also might derive from limited economic activities in the households, as well as in villages. Lack of opportunities drives poor populations, especially in the rural areas which are not provided with a number of services into a subsistence loop and makes them more vulnerable to exogenous shocks. Electrification can be one critical means for helping the rural poor break out of the loop and move away from poverty. Electricity means better health care and education, and opens a wide range of economic opportunities.

11. However, electrification also brings new challenges. For example, new demands need to be addressed. More skilled labor probably will be required. As demand for safe wiring and maintenance rises in newly electrified villages, skilled electricians are likely to be lacking. Training people to fill these new jobs, which could provide alternative sources of income for the rural poor, is a challenge that needs to be addressed.

12. Moreover, the RE program might not be able to reach the most isolated villages and households with the conventional grid due to Bhutan’s peculiar population distribution. Thus, new approaches must be explored, especially renewable resources.

5. Sustainability

a. Willingness to Pay

13. The issue of willingness and/or ability of rural households to pay for connection fees and wiring costs was thoroughly analyzed. The Government is providing free connection kits to the poorer families, while most of the remaining households surveyed have expressed their willingness to pay those costs to have access to electricity. Once connected, households will spend a smaller part of their income on energy than they had before. The average monthly expenditure for kerosene is 3–4 times higher than for electricity. Moreover, electricity will substitute for firewood, which is used mainly for cooking and heating. While firewood is inexpensive, the time spent acquiring the necessary permits and collecting it adds to the cost.

14. Concerning the willingness to pay for PV solar systems, the cost of using alternative sources of energy, particularly kerosene, provides the baseline for comparison. Although a solar system provides free energy once installed, it has higher maintenance costs. By ensuring that the beneficiaries contribute a sum each month as down payment for future maintenance costs, these funds can be used when needed. Recipient households, therefore, are asked to contribute a monthly amount slightly lower than what they would pay for kerosene and firewood.

b. Synergies

15. DHR and the Department of Employment (both under the Ministry of Labor), The Entrepreneurship Promotion Centre (under the Ministry of Trade and Industry), the Ministry of Agriculture and the Ministry of Finance, launched a series of vocational training courses in the early 1990s. These included two training courses for electricians, one for adults and one for younger technicians. The courses are basic, and each occurs once a year. To support the trainees after graduation, the Government has designed concessional credit schemes. The credit schemes have been implemented in agreement with all the financial institutions in Bhutan (Bank of Bhutan, Bhutan National Bank, Bhutan Development Finance Corporation, and Royal Insurance Corporation of Bhutan). The Entrepreneurship Promotion Center and DHR have agreed formally that the scheme will be extended to all technicians trained by DHR, including all the graduated rural electricians trained under the Project.

16. Graduated electricians from the proposed Project, therefore, will be able to use these concessional credit lines to open their workshops and buy wiring materials upfront. As a result, wiring and maintenance can be done in a timely manner to the benefit of the electrician and the customer. The timing of maintenance can be crucial in terms of safety, performance, and cost.

c. Replicability

17. Both project components could be replicated in the future. Component A will provide DHR with the means to replicate training as the RE program continues throughout the country. Component B allows the Government to reach communities that are not likely to be connected to the grid by 2020.

6. Participatory Approach

18. Participation of affected communities is essential to ensure the replicability and the sustainability of the Project.

a. Component A

19. Communities will be consulted during the selection of trainees. Trainees will be chosen in such a way to meet the demand throughout the *Gewogs*. Communities also will be involved in the sensitization program to raise awareness on the new income-generating opportunities that derive from access to electricity.

b. Component B

20. According to the barefoot approach, selected villages will be the owners of the Project. They will be in charge of selecting the trainees and establishing the REWs.

Primary Beneficiaries and Other Affected Groups and Relevant Description	Other Key Stakeholders and Brief Description
Semiliterate rural poor, rural newly electrified households	DOE and DHR. DHR's training capacity will be increased as it will be able to reach out to more trainees. Moreover, graduated trainees will be able to become trainers.

7. Coordination

21. Major development partners in the sector are the Netherlands' Sustainable Development Secretariat and Austria's Coordination Office for Austrian Development Agency, which are financing the electrification of 3,000 and 1,000 rural households, respectively.

22. JICA is supporting the preparation of the Rural Electrification Master Plan, which will be the baseline for the future extension of RE under the Tenth through Twelfth Five-Year Plans. Coordination with JICA will ensure that, in accordance with the master plan, villages selected for component B are the least likely to be electrified under future RE programs. The Japan Bank for International Cooperation is considering financing the next RE program, though the amount has not been decided.

23. Coordination will be critical to the implementation of the proposed Project. In particular, coordination will be required to ensure that the timing of training in villages electrified under other funding agencies' projects will be compatible with the electrification schedule. Electrification will begin before training.

24. Coordination with the other funding agencies also will ensure that replicability of this project can be a key element in future RE programs.

8. Detailed Cost Table

25. Appendix 1 contains the Summary Cost Table, while Appendix 2 has the Detailed Cost Estimates.

C. Link to ADB Strategy and ADB-Financed Operations

1. Link to ADB Strategy

26. With the introduction of 5-year development plans in 1961, Bhutan has been striving steadfastly for balanced social development and economic self-reliance. The energy sector, in particular, is the most relevant one for the Bhutanese economy, accounting for more than 11% of GDP. The most significant contributor to economic growth in Bhutan has been the Chukha Hydropower Project (24 MW), commissioned in 1986, and the ensuing sales of power to India. Since then, two more hydropower projects—Kurichhu (60 megawatt [MW], and Basochhu HPP Stage I (24 MW) and Stage II (40 MW)—were commissioned in the eighth and ninth 5-year plans, respectively. In addition, the Tala Hydropower Project (1,020 MW) will be commissioned by 2006. With domestic capacity demand only at 100 MW, power sales to India contribute about 45% of the Government's revenue. As the Tala project comes on line, this percentage is expected to grow over the next 5 years.

27. Most of the population (about 85%) lives in rural areas. RE, therefore, is a key part of the Government's development strategy. The Government is highly committed to developing RE

and promoting RE projects, which are expected to benefit a larger part of the population. In particular, the target is to electrify the entire population—rural and urban—by 2020. Under the current Ninth Five-Year Plan (2002–2007), 15,000 households are expected to be electrified, raising the electrification rate to 57% of the population.

28. Bringing electricity to rural areas, including remote ones, is a key element of human development, as well as economic growth. Electrification means not only longer productive hours, but also improvements in health care delivery and education. Most of all, however, it means a wider range of opportunities that rural people can exploit to improve their quality of life and their capabilities to generate income. For this reason, an evaluation of the impact of delivering electricity is crucial, based on the activities being carried out by the beneficiaries, as well as the opportunities that are likely to become available.

29. The proposed Project will focus on households and private businesses. Under component A, villagers will be trained to wire private houses and business safely and soundly, as well as to assume responsibility for the related maintenance. The Government will wire public services, such as health centers and schools, because they require more extensive and complex training. Nevertheless, graduated rural electricians are likely to be hired as skilled labor, under the supervision of formally trained electricians (6 years of training).

30. Under component B, public services, particularly schools, can also use PV solar systems. Health centers, however, are expected to keep using gasoline-based generators, which are more reliable and provide electricity 24 hours a day.

31. Both components of the proposed Project are expected to enhance education. Proper electrification can improve productivity, freeing children to study, and provide more time for them to devote to homework at night.

32. ADB has supported the country's electrification effort by financing RE projects and sectoral capacity building technical assistance loans. ADB is Bhutan's major development partner in the power sector. Under Loan 2009-BHU (ADF): Rural Electrification and Network Expansion (the third RE project)[2] and the Ninth Five-Year Plan, ADB is supporting electrification of 8,000 rural households.

33. In 2001, ADB and the Government signed a poverty partnership agreement, which gave specific attention to providing electricity to the 30% of the population living in poverty. The aim was to expand opportunities for families to increase productivity and diversify their economic activities to generate additional income.

Document	Document Number	Date of Last Discussion	Objective(s)
• Bhutan: Country Assistance Plan (2000–2002)		December 1999	Broadening the economic base to ensure that the economy generates sufficient employment and has strong forward and backward links with the rural population. This requires addressing the critical constraints for

[2] ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grants to the Kingdom of Bhutan for the Rural Electrification and Network Expansion.* Manila.

• Bhutan Country Strategy and Program (2006–2010)		August 2005	socioeconomic development and nurturing new engines of growth to augment the contribution from hydropower development and energy-intensive industries. This includes the need to (i) improve transportation networks; (ii) expand access to electrification and social services; (iii) develop more competitive financial markets; (iv) enhance the environment for small- and medium-sized enterprises; (v) promote tourism; (vi) expand urban sites and services; (vii) address financial, skill, and organizational constraints to private initiatives; (viii) make society more conducive to private sector development; and (ix) help the Government to develop a trust fund for health services, and enhance access to opportunities for vocational training services.

2. Link to Specific ADB-Financed Operation

Project Name	Rural Electrification and Network Extension
Project Number	Loan 2009-BHU (ADF)
Date of Board Approval	30 September 2003
Loan Amount ($ million)	$9.4 million (ADF)

3. Development Objectives of the Project

34. The Project aims to connect 30% of rural population (mainly poor) to the grid. While energy is Bhutan's most relevant source of income, it is also a driving force of economic growth at the micro-level.

4. Main Components of the Project

No.	Component Name	Brief Description
1.	Transmission	1.1 Construct 390 circuit kilometers (cct-km) of 33 kilovolt (kV) overhead lines. 1.2 Construct 300 cct-km of 11 kV overhead lines.
2.	Distribution	2.1 Install 160 33/0.4 kV and 170 11/0.4 kV distribution transformers with associated dropout fuse assemblies and low-voltage boards. 2.2 Install 570 cct-km of low-voltage aerial bundled conductors. 2.3 Install service cables and energy meters to 8,000 customers.

5. Rationale for Grant Funding Versus ADB Lending

35. The associated operation is the third Rural Electrification Project in Bhutan (footnote 1). Previous projects highlighted the need for trained electricians to wire newly electrified households safely, and to provide sound maintenance. New projects, which are in the pipeline for the next 5 years, will guarantee the sustainability of the Project.

36. While the Government of Bhutan, particularly DHR, has the expertise, it needs a critical mass of funds to activate a cascading process to train semiliterate rural poor as rural electricians. Trainees then will be given the opportunity to become assistants and trainers.

D. Implementation of the Proposed Grant

Implementing Agencies	Component A: DHR, Ministry of Labor Component B: DOE, Renewable Energy Division

37. DOE is the Executing Agency (EA) for the proposed Project. The director general of DOE will be appointed as the project director and will chair the Steering Committee (SC), which will provide overall direction for the implementation of the Project. A project management unit (PMU) will be established in DOE, Renewable Energy Division. Composed of DOE, DHR, and the Renewable Energy Division, under DOE, the PMU will be responsible for the day-to-day management of the Project, and will coordinate with all government and nongovernment stakeholders. DOE will establish an SC with DHR and BC. The SC will meet at least quarterly to oversee the implementation strategy of the proposed Project, and revise it as necessary. The general terms of reference for the EA and the implementing agencies are outlined in Appendix 4.

38. Given the Project's multidimensional approach to poverty reduction, the establishment of the SC is essential to the successful implementation. The proven expertise and the experience of the EA and implementing agencies will be crucial elements of success, though they will need to be shared to ensure a comprehensive approach to the different issues involved in the implementation. However, the SC will be a strategic instrument, while the implementing agencies will be responsible for implementation.

39. DOE will be responsible for calling the SC meetings. DOE will also be responsible in supervising the selection of villages and beneficiaries. DOE will consult with DHR for any issue related to training. DOE will be responsible for consulting with beneficiaries and addressing issues that may arise due to the implementation of the Project. DOE will provide office space and staff and will host the SC. Finally, DOE will provide all assistance needed for the implementation of the Project. DOE and DHR are expected to monitor the results throughout the project implementation.

40. DHR will be responsible of implementing the training under component A, including selection of external trainers and candidates, provision of material, and per diem disbursement to trainees. They also will be responsible for preparing and disseminating material to inform newly electrified households (including those under component B) of the benefits derived from access to electricity, including health care and education improvements, and a wider range of income-generating opportunities. During training, DHR will provide information on Government soft credit programs for certified technicians. In DHR is expected to review an incentive scheme to limit the risk that graduated trainees will migrate to urban areas of. At the same time, DHR will develop a database system, which will be finalized during training, with the names and location of graduated trainees. Distributed at district level to the households, this will serve as sort of a Yellow Pages. DHR is expected to submit a report after the conclusion of each course. The

graduated trainees will be given the opportunity to become assistant trainers for the following batch, and eventually they can become trainers for subsequent batches.

41. DOE's Renewable Energy Division will be responsible for the implementation of component B. BC will be selected directly as the consultant for this component. In this capacity, BC will select suitable candidates and villages for installation of PV solar systems after training, including the provision of necessary materials. BC will report to DOE monthly, and will submit an interim report on semiannually. The final report shall be submitted 2 months before the end of the Project for comments. In cooperation with DHR, BC will select the recipient villages with "cultural heritage" value. BC, DHR, and DOE will assess the opportunity for establishing a BC branch in Bhutan. BC and DOE also will study the opportunity of replicating the approach, using the proposed Project as a pilot.

42. All parties involved will provide a study with the lessons learned for implementation of future similar projects. Results of both components will be disseminated in a workshop to be organized at the end of the Project.

43. The Project will be implemented over 24 months, starting in June 2006. The team leader will submit an inception report for each component within 1 month of project commencement. An interim report and a draft final report will be submitted 9 and 17 months after project commencement, respectively. The Government and ADB will provide their comments within about 2 weeks of receiving these reports. The draft final report will be finalized at the end of the 6 months after incorporating the Government's and ADB's comments.

44. All procurements under the JFPR grant will be conducted in accordance with ADB's *Guidelines for Procurement*. ADB will recruit BC using direct selection in accordance with ADB's *Guidelines on the Use of Consultants* and other arrangements satisfactory to ADB for the engagement of domestic consultants to provide the services for implementation, management, and progress monitoring of the JFPR grant.

2. Risks Affecting Grant Implementation

Type of Risk	Brief Description	Measure to Mitigate the Risk
Migration	Migration of trained electricians to urban areas	Incentive mechanisms are being designed to avoid or mitigate migration.
Willingness to pay	Willingness to pay for wiring and connection if the Government reduces subsidies	Baseline for monthly contribution is the cost of alternative sources of energy.
Literacy	Low level of literacy in rural areas	Both components are designed to be implemented with a minimum level of education. The Project will allow people with a minimum level of education to break out of the poverty loop.
Timely implementation of RE projects	Possible delays in expected electrification schedule	Training is designed to have a flexible implementation schedule.

3. Incremental ADB Costs

45. No incremental costs are required.

4. Monitoring and Evaluation

Key Performance Indicator	Reporting Mechanism	Plan and Timetable for Monitoring and Evaluation
Component A • No. of rural electricians trained • No. of female trainees • No. of wired households • No. of school enrollments versus dropouts in rural areas	DOE and DHR in-house monitoring Review missions and periodical reports	Reports will be prepared at the end of each batch. By July 2007, results are collected and final report submitted. By October 2007, workshop is carried out.
Component B • No. of villages provided with PV solar systems • No. of new economic establishment, after electrification • No. of school enrollments versus dropouts in rural areas (off-grid villages)	DOE and DHR in-house monitoring. Review missions and periodic reports	Reports will be prepared halfway through the training, at the end of the training, and after the establishment of REWs. By July 2007, results are collected and final report submitted. By October 2007, workshop is carried out.

5. Estimated Disbursement Schedule

Fiscal Year (FY)	Amount ($)
FY 2006	600,000
FY 2007	300,000
FY 2008	100,000
Total Disbursements	**1,000,000**

Appendixes

1. Summary Cost Table
2. Detailed Cost Estimates
3. Fund Flow Arrangement
4. Implementation Arrangements

SUMMARY COST TABLE

($)

Grant Components / Inputs / Expenditure Category	**Component A** Training as rural electricians in newly electrified villages (including grant management for the component)	**Component B** Installation of PV solar systems and training for wiring, installation, maintenance, and spare parts construction in off-grid villages (including grant management for the component)	**Total** (Input)	**Percent**
1. Civil Works: {incl. technical surveys and designs, and supervision of constructions}				
2. Equipment and Supplies: {e.g., power tools, turbines, excavation and construction tools, agicultural tools and equipment, communications devices, audio-visual, computing and other office equipment, furniture, etc.}	76,910	284,625	**361,535**	28.9
3. Training, Workshops, Seminars, and Public Campaigns: {e.g., resources persons, technical training specialists, community mobilizers and organizers, venue rental, travel, food and accommodation for participants, and other related costs}	287,768	98,302	**386,070**	30.9
4. Consulting Services: {e.g., for surveys, assessments and reviews, technical specialists, advisors, external auditors, etc., including related costs such as travel, accommodation and per diem}	18,690	14,000	**32,690**	2.6
5. Grant Management: {management of the specific components and of the PIU, including wages for project staff, travel costs and per diem, office equipment, rental, O&M, and recurrent costs, etc.}	13,000	14,000	**27,000**	2.2
6. Other Inputs: {for other specific project inputs that cannot be included in any of the above categories, such as, specific livelihood development costs by specialized NGOs, seed capital and funds for establishing micro-finance systems, etc.}	18,000	106,950	**124,950**	10.0
7. Contingencies (0--10% of total estimated grant fund): Use of contingencies requires prior approval from ADB.	30,000	37,755	**67,755**	5.4
Subtotal JFPR grant financed	**444,368**	**555,632**	**1,000,000**	80.0
Government Contribution {e.g., salaries for government staff, provision of project office, land acquisition, participation in workshops/meetings}	125,000	125,000	**250,000**	20.0
Other Donor(s) Contributions (e.g., from NGOs, multi- and bilateral aid agencies): {e.g., costs for O&M, livelihood skills development and training, logistic, administration, infrastructure assistance, technology, material and equipment supply, etc.}				
Community's Contributions (mostly in kind): {e.g., participation in all training and community development; land development, and in-kind labor contribution through food for work}				
Total Estimated Costs	**569,368**	**680,632**	**1,250,000**	100.0
Incremental Costs				

Source: ADB estimates.

DETAILED COST ESTIMATES

Code	Supplies and Services Rendered	COSTS Unit	Quantity Units	Cost Per Unit	TOTAL US$	CONTRIBUTIONS JFPR Amount	JFPR Method of Procure-ment	Government	Other Donors
Component A				**Subtotal**	**539,368**	**414,368**		**125,000**	**0**
1.1	**Civil Works**								
1.1.1									
1.1.2									
1.2	**Equipment and Supplies**								
1.2.1	Training equipment	Gewags/batches	79	125	9,875	9,875	competetive		
1.2.2	Tool kits	units	450	120	54,000	54,000	competetive		
1.2.3	Dissemination material	Gewags/batches	79	165	13,035	13,035			
1.3	**Training, Workshops, and Seminars**								
1.3.1	Trainer per diem (1,610 x 79 batches)-each batch five trainees	Gewags/batches	79	1,610	127,190	127,190			
1.3.2	Assistant per diem (732 x 79 batches)	Gewags/batches	79	732	57,828	57,828			
1.3.3	Trainees allowance and Insurance	trainees	395	200	79,000	79,000			
1.3.4	Travel costs for trainers (360 x 79 batches)	Gewags/batches	79	250	19,750	19,750			
1.3.5	Workshop for dissemination of results				4,000	4,000			
1.4	**Consulting Services**								
1.4.1	M&E				13,690	13,690			
1.4.2	Auditing				5,000	5,000			
1.5	**Management and Coordination of this Component**								
1.5.1	Component 1 - staff								
1.5.2	Travel and per diem				62,000	2,000		60,000	
1.5.3	Operational costs				70,000	5,000		65,000	
1.5.4	Computer, administrative supplies				6,000	6,000	competetive		
1.6	**Other Project Inputs (Specify: e.g., costs for NGO's, micro-finance)**								
1.6.1	Database development				18,000	18,000	competetive		
Component B				**Subtotal**	**642,877**	**517,877**		125,000	
2.1	**Civil Works**								
2.1.1									
2.1.2									
2.2	**Equipment and Supplies**								
2.2.1	PV solar system supplies	units/families	345	725	250,125	250,125	direct		
2.2.2	Equipement transport and insurance	units/families	345	100	34,500	34,500	direct		
2.3	**Training, Workshops, and Seminars**								
2.3.1	Barefoot College Training Fees (incl trainees per diem and insurance)	trainees	46	1,312	60,352	60,352	direct		
2.3.2	Travel costs for training and installation	villages	23	1,650	37,950	37,950			
2.4	**Consulting Services**								
2.4.1	M&E				9,000	9,000			
2.4.2	Auditing				5,000	5,000			
2.5	**Management and Coordination of this Component**								
2.5.1	Component 1 - staff								
	Travel and per diem				64,000	4,000		60,000	
	Operational costs				70,000	5,000		65,000	
1.5.4	Computer, administrative supplies				5,000	5,000	competetive		
2.6	**Other Project Inputs (Specify)**								
2.6.1	Barefoot College Fees				69,000	69,000			
2.6.2	Establishment of Rural Electronic Workshop (REW)	REWs	23	1,650	37,950	37,950	direct		
	Components A to B = Subtotal			**Subtotal**	**1,182,245**	932,245			
	Contingency (Maximum 10% of total JFPR Contribution)				**67,755**	67,755			
	TOTAL Grant Costs			**Total**	**1,250,000**	**1,000,000**		**250,000**	
	Incremental Cost Details:								
	TOTAL Incremental Costs								

Source: ADB estimates.

FUND FLOW ARRANGEMENT

1. Funds will be disbursed under the terms of a contractual arrangement with a Government-approved party acceptable to the Asian Development Bank (ADB), through the project management unit (PMU). Further, the PMU will maintain a separate Japan Fund for Poverty Reduction (JFPR) imprest account at a commercial bank in Thimphu, endorsed by Department of Economic Affairs and acceptable to ADB. The JFPR imprest account will be established, managed, replenished, and liquidated in accordance with ADB's *Loan and Disbursement Handbook* and detailed arrangements agreed upon by the Government and ADB. The Department of Human Resources (DHR) will select the trainer for component A and the implementing organization for component B. In this case, given the nature of the proposed Project and the unique approach of Barefoot College (BC), the Government will select BC directly.

2. Once the selection has been carried out to ADB's satisfaction, the Department of Energy (Executing Agency [EA]) will submit to ADB a formal request for the release of funds. The approved budget will be disbursed to the Ministry of Labor, Department of Energy, and Renewable Energy Division (implementing agencies [IAs]), which will maintain a separate JFPR account for DHR and Department of Energy. The initial amount to be deposited into the JFPR imprest account will be based on estimated expenditures for the first 6 months, or 10% of the grant amount, whichever is lower. The statement of expenditures (SOE) procedure will be used for reimbursing eligible expenditures and liquidating the imprest account for any individual payment transaction up to $5,000 equivalent. The PMU shall (i) maintain, or cause to be maintained, separate accounts for the JFPR Project; (ii) have such accounts and related financial statements audited annually, in accordance with appropriate auditing standards consistently applied, by independent auditors acceptable to ADB; (iii) furnish to ADB as soon as available, but in any event not later than 6 months after the end of the fiscal year, certified copies of such audited accounts and financial statements and the report of the auditors relating thereto, including the auditors' opinion on the issue of the JFPR funds, as well as on the use of the imprest account and statement of expenditures provided under the Project, all in English language; and (iv) furnish to ADB such other information concerning such accounts and financial statements and the audit thereof as ADB shall from time to time reasonably request.

3. Replenishment will be subject to the liquidation of expenditures. The accounts should be replenished regularly to ensure that sufficient funds are always available. The PMU will monitor withdrawal applications, which EA must approve. The designated commercial bank will provide monthly statements of the imprest account to the EA and PMU, which will claim liquidation based on the statement and other supporting documents. Arrangements, such as the flow and administrative procedures, will be detailed in the grant implementation manual. The schematic fund flow and implementation arrangements for the JFPR Project are shown in Figure A3.

4. As confirmed by the Government of Japan, interest earned on the JFPR imprest account should be returned to the JFPR fund. At the end of the Project, such interest should be remitted to the JFPR fund account maintained at ADB.

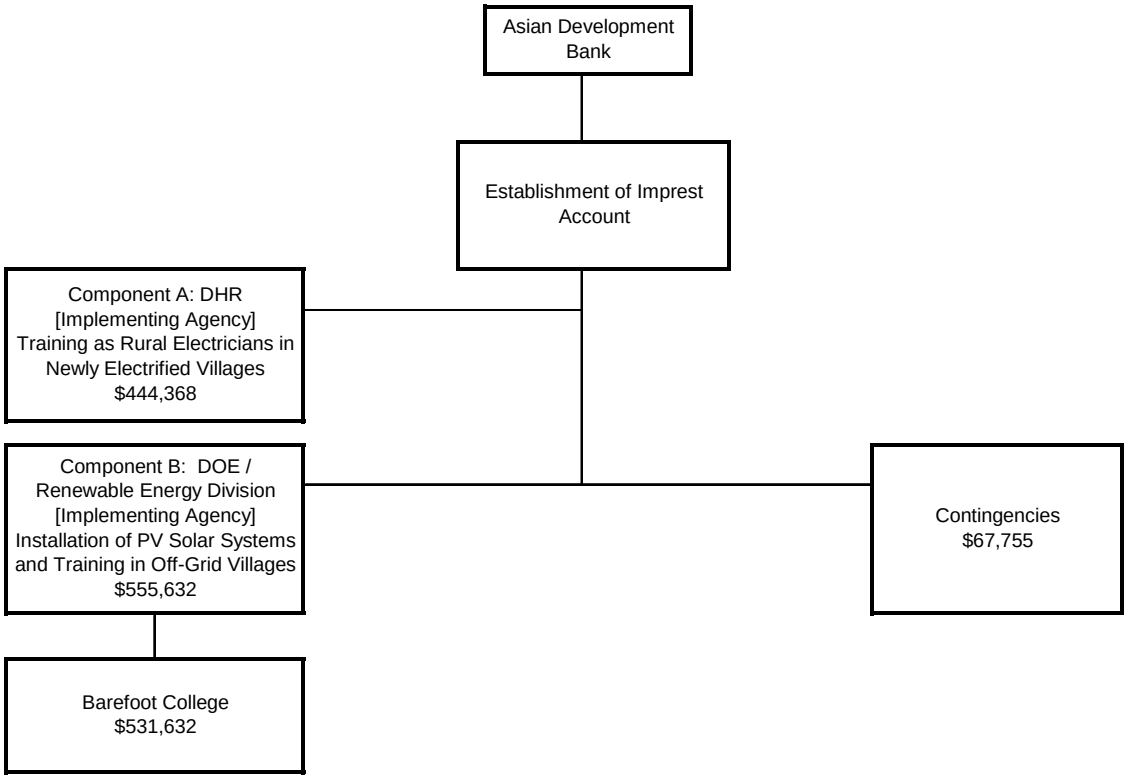
5. The proposed Project will be implemented over 24 months, with an expected grant commencement date of March 2006 and completion in February 2008. Consultants will be selected in accordance with ADB's *Guidelines on the Use of Consultants* and other arrangements satisfactory to ADB for the engagement of domestic consultants. Consultants will ensure transfer of knowledge to counterpart staff in specific areas of expertise in a capacity-building context. Procurement of equipment and materials, and service payments under the

Project, will be in accordance with ADB's *Guidelines for Procurement*. Items costing less than $100,000 equivalent can be procured through direct purchase.

6. For component B, BC will be appointed directly due to its unique approach. BC offers a package on a turnkey basis. They provide training materials, equipment, and PV solar systems, which are compatible with their approach and can be reproduced in the REWs.

7. Disbursement arrangements will comply with ADB's *Loan Disbursement Handbook*. The project implementation unit will create an imprest account in a yet-to-be-identified bank to facilitate implementation. The IAs and BC will maintain a separate accounting record for project expenditures in accordance with sound accounting principles. External auditors acceptable to ADB will audit the accounting record annually. The annual audit reports, in English, will be submitted to ADB within 6 months after the end of the Government's fiscal year. A project implementation completion report should be submitted to ADB within 3 months after grant closing date.

Figure A.3: Fund Flow Arrangements for JFPR Project



DHR = Department of Human Resources, DOE = Department of Energy, PV - photo-voltaic.
Source: ADB estimates.

IMPLEMENTATION ARRANGEMENTS

1. The Department of Energy (DOE) is the Executing Agency (EA) for the proposed Project. The director general of DOE will (i) serve as the project director, (ii) chair the Steering Committee (SC), and (iii) provide overall direction for the implementation of the Project. A project management unit (PMU) will be established in DOE, Renewable Energy Division. Composed of DOE, Department of Human Resources (DHR), and the Renewable Energy Division, under DOE, the PMU will be responsible for the day-to-day management of the Project, and will coordinate with all government and nongovernment stakeholders. DOE will establish SC with DHR and Barefoot College (BC). The SC will meet at least quarterly to oversee the implementation strategy of the proposed Project, and revise it as necessary. The general terms of reference for the EA (DOE) and the implementing agencies (DHR and DOE's Renewable Energy Division) are outlined in paragraphs 11–13.

2. Given the Project's multidimensional approach to poverty reduction, the establishment of the SC is essential to successful implementation. The proven expertise and the experience of the EA and implementing agencies will be crucial elements of success, though they will need to be shared to ensure a comprehensive approach to the different issues involved in the implementation.

3. DOE will be responsible for calling the SC meetings. DOE will also be responsible in supervising the selection of villages and beneficiaries. DOE will consult with DHR on any issue related to training. DOE will be responsible for consulting with beneficiaries and addressing issues that might arise due to the implementation of the Project. DOE will provide office space and staff, and will host the SC. Finally, DOE will provide all assistance needed for the implementation of the Project. DOE and DHR are expected to monitor the results throughout project implementation.

4. DHR will be responsible of the training under component A, including selection of external trainers (through competitive selection process) and candidates, provision of material, and per diem disbursement to trainees. DHR also will be responsible for preparing and distributing dissemination material to inform newly electrified households (including those under component B) of the benefits derived from access to electricity. These include health care and education improvements, and access to a wider range of income-generating opportunities. During training, DHR will provide information on Government soft credit programs for certified technicians. DHR is expected to study an incentive scheme to limit the risk of graduated trainees migrating to urban areas. At the same time, DHR will develop a database system, which will be finalized during training, with the names and location of graduated trainees. Distributed at district level to households, this will serve as a sort of Yellow Pages. DHR is expected to submit a report after the conclusion of each course. As agreed, graduated trainees will be given the opportunity to become trainer assistants for the following batch, and eventually they will have the chance to become trainers.

5. BC is a globally known nongovernment organization. Started 34 years ago in the village of Tilonia in Rajasthan, India, BC is the only college built by the poor for the poor. The objectives of the college are to identify and recognize traditional knowledge, village skills, and practical wisdom of the poor, and apply them for their own development. BC believes that illiteracy is not a barrier to acquiring and developing skills. Any illiterate or semiliterate rural man or woman, given the opportunity and the mental and physical space to develop themselves at their own pace, have the capacity and competence to be "barefoot" doctors, teachers, solar and water engineers, and architects. BC is also the only fully solar powered college in India—45

kilowatt (kW) of solar panels power 20 computers, E-mail, 500 tube lights, 70 fans, photocopying machine, VCRs, camcorders, editing machine, slide projectors, and battery charger. The concept of the barefoot approach has been replicated in 13 states of India, and in five other developing countries around the world (Afghanistan, Ethiopia, Nepal, Senegal, and Sierra Leone). DHR has supported strongly having BC directly involved in the design and implementation of the Project.

6. BC will be responsible for implementing component B—from selection of suitable candidates and villages to installment of photovoltaic (PV) solar systems after training, including the provision of all necessary materials. BC will report to DOE monthly, and will submit an interim report semiannually. The final report shall be submitted 2 months before the end of the Project for comments. In cooperation with DHR, BC will select recipient villages with "cultural heritage" value. BC, DHR, and DOE will assess the opportunity of establishing a BC branch in Bhutan. BC and DOE also will study the opportunity of replicating the approach, using the Project as a pilot.

7. All parties involved will provide a study with the lessons learned for implementation of future similar projects. Results of both components will be disseminated in a workshop to be organized at the end of the Project.

8. The Project will be implemented over 24 months, starting in June 2006. The team leader will submit an inception report for each component within 1 month after project commencement. An interim report and a draft final report will be submitted 9 and 17 months after project commencement, respectively. The Government and Asian Development Bank (ADB) will provide their comments about 2 weeks after receiving these reports. The draft final report will be finalized at the end of the 6 months after incorporating the Government's and ADB's comments.

9. Procurements under the Japan Fund for Poverty Reduction (JFPR) grant will be conducted in accordance with ADB's *Guidelines for Procurement*. ADB will recruit BC in accordance with ADB's *Guidelines on the Use of Consultants* to provide the services for implementation, management, and progress monitoring of the JFPR grant.

A. Terms of Reference

10. DHR and BC will implement the Project under DOE supervision. For the successful implementation of the Project, all parties involved need to produce a number of deliverables.

1. DOE

11. DOE will be responsible for

(i) managing the Project;
(ii) coordinating the implementation of the Project, ensuring that it is compatible with the renewable energy (RE) schedule;
(iii) supervising the activities and submit a progress report semiannually;
(iv) chairing the SC and call meetings quarterly;
(v) ensuring that the Government waives all duties on goods imported for the implementation of this Project;
(vi) providing office space and will devote part of its staff's time to the implementation and the management of the Project;

(vii) introducing the BC to the 20 *Dzongkhag* across the country by providing a letter outlining the reasons why the non-electrified villages are being surveyed;
(viii) asking the district administration to provide a guide to accompany the BC team to the non-electrified villages;
(ix) documenting and monitoring the implementation with DHR, and also will be in charge of drafting the final report; and
(x) organizing the workshop at the end of the Project for dissemination of the results.

2. DHR

12. DHR will be responsible for

(i) coordinating with DOE in implementing the Project;
(ii) selecting the external trainers through a competitive process that satisfies ADB;
(iii) selecting beneficiaries, on a nondiscriminatory basis, in the identified villages (on an average of 5 per *Gewog)*;
(iv) developing the training schedule and related work plan, in consultation with DOE;
(v) developing an appropriate training course for rural electricians, and select the necessary staff;
(vi) providing all the necessary equipment and material for training;
(vii) carrying out the training in the selected *Gewogs*;
(viii) monitoring the work of the graduated rural electricians to ensure that safety and quality is met;
(ix) providing skills upgradation trainings, if and when necessary;
(x) preparing and disseminating materials on electrification benefits and income-generating opportunities due to access to electricity;
(xi) documenting and monitoring the implementation, in cooperation with DOE;
(xii) submitting a financial report, with the eligible expenditure, at the end of every month, and a report at the end of each training batch;
(xiii) creating, operating, and maintaining a database of all graduated rural electricians, which should be made available to all stakeholders, particularly at *Dzongkhags* level; and
(xiv) informing trainees of credit schemes and other opportunities.

3. DOE's Renewable Energy Division

13. Renewable Energy Division will be responsible for

(i) coordinating with DOE, DHR, and BC;
(ii) implementation of component B; and
(iii) preparing a financial report with all the eligible expenditures at the end of every month, and a report at the end of each training batch.

4. Barefoot College (24 person-months)

14. BC will be selected directly using in accordance with ADB's *Guidelines on the Use of Consultants* and other arrangements satisfactory to ADB for the engagement of domestic consultants. The cost of their services is divided by the number of families in selected villages. This cost ($1,650 per family plus contingencies) includes training of solar engineers (two per village), installation of PV solar systems, establishment of rural electronic workshops,

management costs, insurance, and travel expenses. The cost has been broken down in the tables in Appendixes 1 and 2.

(i) BC will provide the logistics support to select and identify at least 23 remote, inaccessible villages for solar electrification, adopting the barefoot approach under the JFPR-financed Project.
(ii) The selection process will involve several field visits to the villages and interacting with the communities, taking them into confidence from the start of the planning and implementation of the Project.
(iii) BC will prepare the remote communities by building understanding, acceptance, application, and ownership of the solar units to be installed in each house.
(iv) BC will train 46 barefoot solar engineers (BSE) and complete the solar installation of all the houses in the 23 villages by the end of December 2006.
(v) BC will break up the training into two batches of 23 each. The first batch will be trained in Tilonia, India for 6 months, while the other 23 will be trained in Bhutan.
(vi) BC will treat this as a turnkey project with the training of the BSEs, the purchase of the solar units, and the installation at the house hold level as a part of a complete package.
(vii) The solar units will be introduced to the villages/households only after the training is completed to the satisfaction of the BC.
(viii) BC will open a bank account in Thimphu for the duration of the Project.
(ix) BC will begin identifying the 23 villages before June 2005. Amongst those villages that are included in the official list of un-electrified villages.
(x) BC will treat this as an innovative pilot project. The idea is to explore informal, simplified, but publicly accountable, procedures that could be handled and owned by the community and replicated on a large scale.
(xi) BC will document this process visually, with a view to preparing a film that will indicate the process and impact of the barefoot approach.
(xii) BC will be responsible for the overall administration and supervision of the project. Narrative reports and audit statements will be submitted to the prescribed authority.
(xiii) BC will report directly to the PMU appointed for the duration of the Project.
(xiv) BC, DHR, and DOE will explore the possibility of establishing a BC branch in Bhutan.

5. Other Consultants (4 person-months)

15. A local consultant will be hired to undertake the results analysis. The consultant shall:

(i) Assess the project impacts according to the Key Performance Indicators (KPI).
(ii) Revise the KPIs, if necessary.
(iii) Prepare a report to be used during the workshop for dissemination of the results.