

**ASIAN DEVELOPMENT BANK**

**TPA:BHU 2003-25**

**TECHNICAL ASSISTANCE PERFORMANCE AUDIT REPORT**

**ON**

**INSTITUTIONAL STRENGTHENING AND POLICY SUPPORT**

**TO THE POWER SECTOR**

**IN**

**BHUTAN**

**October 2003**

## CURRENCY EQUIVALENTS

Currency Unit – Ngultrum (Nu)

|                        |   | <b>At TA Approval</b> | <b>At TA Completion</b> | <b>At TA Evaluation</b> |
|------------------------|---|-----------------------|-------------------------|-------------------------|
| <b>TA 2400-BHU</b>     |   | (September 1995)      | (March 1997)            | (July 2003)             |
| Nu1.00                 | = | \$0.0294              | \$0.0278                | \$0.0210                |
| \$1.00                 | = | Nu33.96               | Nu35.90                 | Nu47.62                 |
| <br><b>TA 3112-BHU</b> |   | <br>(December 1998)   | <br>(March 2001)        | <br>(July 2003)         |
| Nu 1.00                | = | \$0.0235              | \$0.0214                | \$0.0210                |
| \$1.00                 | = | Nu42.54               | Nu46.60                 | Nu47.62                 |
| <br><b>TA 3307-BHU</b> |   | <br>(November 1999)   | <br>(March 2002)        | <br>(July 2003)         |
| Nu 1.00                | = | \$0.0230              | \$0.0205                | \$0.0210                |
| \$1.00                 | = | Nu43.41               | Nu48.77                 | Nu47.62                 |

## ABBREVIATIONS

|       |   |   |
|-------|---|---|
| ADB   | – | Asian Development Bank                        |
| ADTA  | – | advisory technical assistance                 |
| BEA   | – | Bhutan Electricity Authority                  |
| BPC   | – | Bhutan Power Corporation                      |
| CHPC  | – | Chhukha Hydropower Corporation                |
| DHPC  | – | Druk Hydropower Corporation                   |
| DOE   | – | Department of Energy                          |
| DOP   | – | Department of Power                           |
| kWh   | – | kilowatt-hour                                 |
| kV    | – | kilovolt                                      |
| LRMC  | – | long-run marginal cost                        |
| MOF   | – | Ministry of Finance                           |
| MW    | – | megawatt                                      |
| NORAD | – | Norwegian Development Assistance Division     |
| OEM   | – | operations evaluation mission                 |
| TA    | – | technical assistance                          |
| toe   | – | tons of oil equivalent                        |
| TOR   | – | terms of references                           |
| TPAR  | – | technical assistance performance audit report |

## NOTES

- (i) The fiscal year (FY) of the Royal Government of Bhutan ends on 30 June. FY of the Bhutan Power Corporation ends on 31 December.
- (ii) In this report, "\$" refers to US dollars.

## CONTENTS

|  | Page |
|--|------|
| BASIC DATA   | ii   |
| EXECUTIVE SUMMARY  | iv   |
| I. BACKGROUND  | 1    |
| A. Introduction  | 1    |
| B. Rationale, Objectives, and Scope of the TAs           | 1    |
| C. Completion and Self Evaluation                        | 2    |
| D. Operations Evaluation                                 | 3    |
| II. ASSESSMENT OF IMPLEMENTATION PERFORMANCE             | 3    |
| A. Design of the TAs                                     | 3    |
| B. Engagement of Consultants                             | 5    |
| C. Organization and Management                           | 5    |
| D. Implementation Schedule and Financing Arrangements    | 5    |
| E. Supervision   | 6    |
| III. EVALUATION OF OUTPUTS AND IMPACTS                   | 6    |
| A. Adequacy and Quality of Reports and Services Provided | 6    |
| B. Institution Building and Reform                       | 8    |
| C. Performance of Consultants                            | 9    |
| D. Impact of TAs   | 9    |
| IV. OVERALL ASSESSMENT                                   | 10   |
| V. CONCLUSIONS   | 11   |
| A. Key Issues  | 11   |
| B. Lessons Identified                                    | 13   |
| C. Follow-Up Actions and Recommendations                 | 14   |
| APPENDIXES   |      |
| 1. Overview of the Bhutan Electricity Sector             | 16   |
| 2. Technical Assistance Ratings                          | 19   |

## BASIC DATA

### TA 2400-BHU: INSTITUTIONAL AND FINANCIAL DEVELOPMENT OF DEPARTMENT OF POWER<sup>1</sup>

| <b>Cost Financed by ADB ('000)</b> | <b>Estimated</b> | <b>Actual</b> |
|------------------------------------|------------------|---------------|
| Foreign Exchange                   | 400              | 392           |
| Local Currency                     | -                | -             |
| <b>Total</b>                       | <b>400</b>       | <b>392</b>    |

|  |      |      |
|--|------|------|
| <b>Number of Person-Months</b> (consultants) | 12.0 | 12.0 |
|--|------|------|

**Executing Agency:** Department of Power, Ministry of Trade and Industry

| <b>Milestones</b>          | <b>Actual</b> |
|----------------------------|---------------|
| President's/Board Approval | 19 Sep 1995   |
| Signing of TA Agreement    | 17 Nov 1995   |
| Start of Fieldwork         | 1 Jul 1996    |
| TA Completion: Expected    | 31 Jan 1997   |
| Actual                     | 31 Mar 1997   |
| TCR Circulation            | 7 Jan 2002    |

| <b>Missions Type</b>  | <b>Number</b> | <b>Date</b>       |
|-----------------------|---------------|-------------------|
| Fact-finding          |               | 5–16 Mar 1995     |
| Inception             | 2             | 1–3 Apr 1996      |
|                       |               | 7–10 Aug 1996     |
| Review                | 2             | 19 Mar–3 Apr 1996 |
|                       |               | 20–22 Feb 1997    |
| Operations Evaluation | 1             | 30 Jun–9 Jul 2003 |

### TA 3112-BHU: Policy and Legal Framework for Power Sector Development

| <b>Cost Financed by ADB ('000)</b> | <b>Estimated</b> | <b>Actual</b> |
|------------------------------------|------------------|---------------|
| Foreign Exchange                   | 462              | 434           |
| Local Currency                     | 38               | -             |
| <b>Total</b>                       | <b>500</b>       | <b>434</b>    |

|  |      |      |
|--|------|------|
| <b>Number of Person-Months</b> (consultants) | 18.0 | 18.0 |
|--|------|------|

**Executing Agency:** Department of Power, Ministry of Trade and Industry

| <b>Milestones</b>          | <b>Actual</b> |
|----------------------------|---------------|
| President's/Board Approval | 8 Dec 1998    |
| Signing of TA Agreement    | 1 Mar 1999    |
| Start of Fieldwork         | 1 Jul 1999    |
| TA Completion: Expected    | 31 Mar 2000   |
| Actual                     | 31 Mar 2001   |
| TCR Circulation            | 20 Sep 2001   |

| <b>Missions Type</b>  | <b>Number</b> | <b>Date</b>       |
|-----------------------|---------------|-------------------|
| Fact-finding          | 1             | Aug 1998          |
| Review                | 1             | 13–23 Mar 2001    |
| Operations Evaluation | 1             | 30 Jun–9 Jul 2003 |

<sup>1</sup> Attached to Loan1375-BHU (SF): Rural Electrification Project.

**TA 3307-BHU: Corporatization of Division of Power**

| <b>Cost Financed by ADB ('000)</b> | <b>Estimated</b> | <b>Actual</b> |
|------------------------------------|------------------|---------------|
| Foreign Exchange                   | 557              | 598           |
| Local Currency                     | 43               | -             |
| <b>Total</b>                       | <b>600</b>       | <b>598</b>    |

|  |      |      |
|--|------|------|
| <b>Number of Person-Months</b> (consultants) | 20.0 | 20.0 |
|--|------|------|

**Executing Agency:** Department of Power, Ministry of Trade and Industry

| <b>Milestones</b>          | <b>Actual</b> |
|----------------------------|---------------|
| President's/Board Approval | 25 Nov 1999   |
| Signing of TA Agreement    | 12 Jan 2000   |
| Start of Fieldwork         | 12 Jun 2000   |
| TA Completion: Expected    | 15 Jan 2002   |
| Actual                     | 31 Mar 2002   |
| TCR Circulation            | 2 Apr 2003    |

| <b>Missions Type</b>  | <b>Number</b> | <b>Date</b>       |
|-----------------------|---------------|-------------------|
| Fact-finding          | 1             | 22 Feb–3 Mar 1999 |
| Inception             | 1             | Jul 2000          |
| Tripartite            | 1             | 11 Dec 2000       |
| Review                | 1             | 13–23 Mar 2002    |
| Operations Evaluation | 1             | 30 Jun–9 Jul 2003 |

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ADB = Asian Development Bank, TA = technical assistance, PCR = project completion report

## EXECUTIVE SUMMARY

Until July 2001, the domestic electricity supply in Bhutan was the responsibility of the Department of Power (DOP), which was part of the Ministry of Trade and Industry. Revenue from the sale of electricity was included in the Government's overall revenue, while DOP's operating costs were funded directly from the national budget. DOP operated primarily as a cost center. DOP's commercial operations were not separated financially from its regulatory and policy-making roles, and there was little incentive to relate domestic electricity tariffs to the economic cost of supply. A policy dialogue was initiated with the Government in the mid-1990s about increasing the efficiency of the power sector. This dialogue addressed three main issues: (i) the institutional strengthening and corporatization of the utility function of DOP to make it commercially orientated; (ii) the revision of domestic electricity tariffs to bring them closer to the economic cost of supply, thereby improving DOP revenue and encouraging more efficient use of electricity; and (iii) the role of the private sector in future hydropower development. To support the restructuring effort, the Asian Development Bank (ADB) provided the Government with three advisory technical assistance (TA) grants totaling \$1.5 million between 1995 and 1999.

The TAs evaluated in this TA performance audit report aimed to address the Government's weak institutional capacity to implement the sector restructuring program in phases. The TAs were relevant in varying degrees and generally justified in terms of the Government's priorities for the sector, and conformed with ADB's country and sector operational strategies. TA 2400-BHU was aimed at (i) developing and implementing for DOP a computerized utility accounting system that would be more appropriate for a corporation than a government's cash accounting system, and (ii) designing a domestic tariff structure to support the needs of the power sector. TA 3112-BHU was designed to assist the Government in developing an appropriate industry structure and establishing a policy and legal framework to facilitate the reorganization of the industry and encourage private sector participation in the power sector. TA 3307-BHU was intended to support the transition of DOP's utility function from a government department to a corporation.

While the TAs were designed generally in line with these objectives, some design weaknesses were identified: (i) the time allowed for consulting input was inadequate given the broad scope covered by the terms of references (TOR), and (ii) the TA design did not adequately take into account the sequencing and timeframe for the required actions to take place. These design weaknesses could indicate an inadequate needs analysis prior to TA design.

The TAs were completed within the budget, though implementation was delayed between 2 and 6 months. While the recommendations made in the TAs largely have been implemented, some of the TA objectives have not been achieved fully.

**TA 2400-BHU: Institutional and Financial Development of DOP.** The computerized accounting system, one of the principle components of the TA, was installed only as a pilot system. It soon fell into disuse, partly due to software problems. As a pilot system that was not required for day-to-day operations, DOP staff also did not see the new system as a management priority. The system was later upgraded and extended. The upgraded system still was not user-friendly, however, and has required the correction of software bugs and the development of additional modules to meet the requirements. Implementation of the computerized accounting system is ongoing and may not be completed by the start of FY2005. However, the national tariff study was comprehensive and has formed a sound basis for ongoing work on the appropriate price for domestic electricity. The current domestic electricity price structure is based on the work completed in this TA.

**TA 3112-BHU: Policy and Legal Framework for Power Sector Development.** The most important outputs were the definition of a new power sector structure and the development of the draft electricity act (the act). After some refinement by the Government, the National Assembly passed the act in July 2001. The act is still awaiting ratification by the minister of trade and industry because the necessary implementation rules and regulations are not in place. The TA did not develop these rules and regulations as expected. In addition, the technical codes produced were limited and did not take sufficient account of current practices in Bhutan. These works are still required and will be undertaken under subsequent TAs, funded by ADB and other external assistance.

**TA 3307-BHU: Corporatization of DOP.** The detailed action plan and resource manual for the corporatization of DOP's utility functions, both developed under the TA, were critical to a process that culminated in the establishment of Bhutan Power Corporation (BPC) in July 2002. The design of the TA was based on the need to structure an industry that was financially sustainable and conducive to private sector participation in hydropower development. While the Government viewed the industry model developed under the TA as too complex, the simplified commercial arrangements currently in place arguably do not provide a solid basis for private sector participation as envisaged.

Of the three TAs covered by this report, one is rated successful and two partly successful.

Several lessons have been learned from the evaluation. First, the development of a computerized accounting system is much more complex than commonly envisaged. Before developing new accounting software, a government should agree that the new accounting system, when operational, could replace the one currently in use. Because accounting software requires customization to meet an organization's specific requirements, accounting knowledge and skilled information technology support are needed. This is an ongoing task as many problems are not immediately apparent. Second, while the TAs have provided an overall vision for power sector reform, many of the actions recommended did not take sufficient account of the unique characteristics of the Bhutan electricity industry. Some of the TA objectives were overly ambitious and have not been achieved fully. This suggests that more attention should be paid to domestic characteristics and conditions at TA formulation and during implementation. Last, the time allowed for counterpart feedback was often inadequate, which resulted in a lack of ownership by the Government. In designing future TAs for Bhutan, ADB will need to be more sensitive to such issues and realistic with respect to the time and resources necessary for the TOR.

The evaluation identified two follow-up actions: (i) the Government and ADB should reach an agreement on an acceptable increase in domestic electricity prices, recognizing that the political argument for raising domestic prices in Bhutan is weaker than in many other developing countries; and (ii) indicators other than the standard financial covenants should be adopted to gauge the efficiency of the electricity supply or the effectiveness of sector reform in Bhutan. As a whole, the power sector will be financially and economically sustainable irrespective of the level of domestic tariffs in the medium term. In this regard, the effectiveness of Bhutan Electricity Authority should be closely monitored to ensure efficient operation of the country's domestic electricity supply.

## I. BACKGROUND

### A. Introduction

1. When the Asian Development Bank (ADB) was processing its first rural electrification project loan<sup>1</sup> to Bhutan in 1995, the Department of Power (DOP), which was part of the Ministry of Trade and Industry, was responsible for the country's domestic electricity supply. Revenue from the sale of electricity was included in the Government's overall revenue, while DOP's operating costs were funded directly from the national budget. DOP operated primarily as a cost center. DOP's commercial operations were not separated financially from its regulatory and policy-making roles, and there was little incentive to relate domestic electricity tariffs to the economic cost of supply. ADB initiated a policy dialogue with the Government in the mid-1990s about increasing the efficiency and sustainability of the power sector. This dialogue focused on three main issues: (i) the institutional strengthening and corporatization of the utility function of DOP to make it commercially orientated; (ii) the revision of domestic electricity tariffs to bring them closer to the economic cost of supply, thereby improving DOP revenue and encouraging more efficient use of electricity; and (iii) the role of the private sector in future hydropower development. The policy dialogue and subsequent technical assistance (TA) grants from ADB resulted in revision of tariffs, the passage of the Electricity Act (the act) in July 2001 and the formation of the Bhutan Power Corporation (BPC) in July 2002.

2. This technical assistance performance audit report (TPAR) evaluates three advisory TAs<sup>2</sup> geared to supporting the restructuring of the power sector. These TAs were approved between 1995 and 1999 and completed between 1997 and 2002. The total approved amount for these TAs was \$1.5 million. DOP was the executing agency for the TAs.

3. Because savings from a project preparatory TA<sup>3</sup> were used to upgrade the software modules provided under TA 2400-BHU and to provide additional modules, the outcomes of this component of TA 2912-BHU are also discussed in this report. This work formed an integral part of ADB's TA program leading to the formation of BPC.

### B. Rationale, Objectives, and Scope of the TAs

4. The Government requested that ADB provide TAs to implement the restructuring program of DOP in phases. The TAs prepared in response to the request addressed the weak institutional capacity of the Government to implement the sector reform in line with its Eighth Five-Year Plan (1997–2002).

5. TA 2400-BHU aimed to (i) develop and implement a computerized utility accounting system for DOP that would be more appropriate for a corporation than a government's cash accounting system and (ii) design a domestic tariff structure to support the needs of the power sector. TA 3112-BHU was designed to assist the Government in establishing a policy and legal framework for the future corporatization of DOP and private sector participation in hydropower development. TA 3307-BHU was intended to support the transition of DOP's utility function from

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<sup>1</sup> Loan 1375-BHU: Rural Electrification Project, for \$7.5 million, approved on 19 September 1995.

<sup>2</sup> TA 2400-BHU: Institutional and Financial Development of Department of Power, for \$400,000, approved in September 1995; TA 3112-BHU: Policy and Legal Framework for Power Sector Development, for \$500,000, approved in December 1998; and TA 3307-BHU: Corporatization of DOP, for \$600,000, approved in November 1999.

<sup>3</sup> TA 2912-BHU: Second Rural Electrification Project, for \$600,000, approved on 19 November 1997.

a government department to a corporation. Key activities and outputs expected from the TAs are itemized in the following box.

#### **Key Activities and Outputs Expected from the TAs<sup>4</sup>**

##### **TA 2400-BHU: Institutional and Financial Development of Department of Power**

Part A: Financial Development

- (i) Install and operate basic, computerized accounting systems and procedures with particular emphasis on the modules of overall system that are essential to account for (a) generation and bulk purchase of electricity; (b) sales to consumers; (c) own use by DOP and their employees; (d) receivables due from consumers; and (e) transfer of cash between accounting units.
- (ii) Install and operate appropriate internal control and financial planning, budgeting and monitoring systems for improved management and control; and
- (iii) Recommend training programs to be developed.

Part B: Tariff Study

- (i) Develop a tariff policy based on appropriate financial and social objectives; and
- (ii) Formulate a suitable tariff structure to meet sector objectives based on voltage levels and consumption patterns.

##### **TA 3112-BHU: Policy and Legal Framework for Power Sector Development**

- (i) Review the existing legislation for the power sector and draft an electricity act;
- (ii) Draft necessary subsidiary legislation such as technical and accounting standards to operationalize the electricity act, and implementing rules and regulations to facilitate implementation of various provisions in the electricity act;
- (iii) Develop recommendations for price regulation, specifying the principles, criteria, methodology, and procedures for establishing and adjusting the bulk and retail electricity tariff; and
- (iv) Develop recommendations on hydropower development policy and legal, financial, and technical guidelines for hydropower development, which will provide a basis for solicitation of project developers such as public/private joint ventures.

##### **TA 3307-BHU: Corporatization of DOP**

- (i) Appraise and estimate the value of the assets being transferred from RGOB to the corporatized DOP;
- (ii) Recommend an adequate financial structure for the corporatized DOP, such as assets and liability structure, debt-equity ratio, and other financial arrangement to ensure financial viability of the corporatized DOP;
- (iii) Prepare a tariff adjustment plan to achieve a rate of return at least 6 percent on the net fixed assets, debt service ratio of at least 1.5, and self financing ratio of at least 20 percent by FY 2005 and thereafter;
- (iv) Formulate an appropriate organizational structure for DOP and finalize a human resource development program for the corporatized DOP; and
- (v) Assist DOP to strengthen its finance and accounting section to enable them to implement the full commercial accounting system and procedures as necessary under the corporatized DOP.

### **C. Completion and Self Evaluation**

6. Each concerned operations department self-evaluated the TAs covered by this TPAR. TA 2400-BHU was evaluated as part of the project completion report for Loan 1375-BHU, and no overall rating was given. TA 3112-BHU and TA 3307-BHU were evaluated on a stand-alone basis and a TA completion report (TCR) was prepared for each. The TCR for TA 3112-BHU rated it successful and the TCR for TA 3307-BHU highly successful. This TPAR found the TCRs focused mainly on action-oriented outputs rather than outcomes.

<sup>4</sup> These activities and outputs were extracted from the terms of references of each TA.

## D. Operations Evaluation

7. An operations evaluation mission (OEM)<sup>5</sup> visited Bhutan in June–July 2003 and held discussions with representatives of Government agencies, DOP and BPC. The OEM reviewed relevant ADB records and analyzed pertinent data collected in the field. The OEM then evaluated the three TAs in terms of (i) the adequacy of design and input, (ii) the quality of consulting services, (iii) the outputs and impacts, (iv) the acceptance of the recommendations, and (v) the actions taken to implement them. Finally, the OEM identified lessons learned and follow-up actions for ADB's future power sector operations in Bhutan. Copies of the draft TPAR were sent to DOP, the Government, and ADB staff for review. Comments received were considered in finalizing the TPAR.

## II. ASSESSMENT OF IMPLEMENTATION PERFORMANCE

### A. Design of the TAs

8. The design of the TAs needs to be evaluated in the context of the Bhutan electricity sector (Appendix 1), which differs in significant ways from those in most other countries. In particular: (i) Bhutan has an abundance of hydroelectric resources and a large, readily accessible export market for its hydroelectric energy; and (ii) increased domestic use of electricity produced by hydropower rather than existing energy sources, which are relatively less efficient and more environmentally damaging, could have significant environmental benefits. In the medium term, the sector as a whole will continue to be financially and economically sustainable as the export price of electricity—which is ultimately driven by the cost of electricity in the north Indian market—is significantly higher than the cost of generation in Bhutan. However, because of the topography of the country and the widely dispersed population, the costs of transmission and distribution to supply the domestic market are very high by international standards. These costs will become an increasing burden on BPC as rural electrification is extended in accordance with the Government's goal of providing all households with access to electricity by 2020.

9. The TAs were formulated on the basis of a two-phased approach for the institutional development of DOP envisaged at appraisal of Loan 1357-BHU in 1995. The first phase aimed to ensure the financial viability of DOP, while the second phase focused on the conversion of DOP into an autonomous corporate body. Approaching DOP's institutional development in phases was considered appropriate in view of the constraints on the Government's implementation capacity and the absence of an appropriate regulatory framework at the time. In general, the designs of the TAs responded to these issues and were relevant to Government's priorities for the sector and ADB's country strategy.

10. TA 2400-BHU consisted of two subprojects: (i) the institutional and financial development of DOP and (ii) a national tariff study. Each subproject was defined separately with distinct terms of reference (TOR) and reporting requirements. The objective of the institutional and financial development component was to strengthen accounting procedures, particularly in relation to consumer accounting and inventory control. A focus on revenue collection was appropriate given the previous lack of attention to revenue collection by a Government department that was structured as a cost center and funded by Government budget allocations. While the TOR attempted to be precise, there were some inconsistencies. For example, the TOR required a review of existing practices that focused on revenue and cash accounting.

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<sup>5</sup> The OEM comprised H. Wang (evaluation specialist) and G. Brown (staff consultant).

However, the lengthy list of systems to be covered by the review “as a minimum” included systems such as accounts payable and depreciation that had little relevance to the main focus of the subproject. Another inconsistency was found in the requirement to set up “the consumer accounting system (from micro to macro level),” while the TOR also referred to setting up a “pilot” system. Thus, in spite of the attempts at precision, the TOR—when read in its entirety—was quite imprecise and covered a broad scope. This confusion could indicate an inadequate needs analysis prior to TA design. The design of the second part of the TA, the national tariff study, was much more specific and consistent. The report and recommendation of the president for the first rural electrification loan (footnote 1) reflects the significant discussion between the Government and ADB on the appropriate domestic electricity price. The TOR’s design was focused specifically on the issues raised in these talks.

11. TA 3112-BHU was aimed at assisting the Government in establishing a policy and legal framework for the future corporatization of DOP, while encouraging private sector participation in the hydropower subsector. The main components of the TOR included developing (i) an electricity act; (ii) subsidiary legislation, such as technical and accounting standards and implementing rules and regulations; (iii) recommendations on sector structure, regulatory framework, and principles; (iv) recommendations for regulatory procedures to review and approve investment programs proposed by electric utilities and independent power producers; (v) a hydropower policy with legal, financial, and technical guidelines that would be the basis for soliciting proposals for private sector involvement in the development of the subsector; and (vi) recommendations for guaranteeing currency convertibility, mortgaging of project assets, taxation, and risk sharing for private sector hydropower projects. The scope of the TOR was very broad and covered the policy and legislation that would underpin the development of the electric power industry in Bhutan for years to come. Much of the work required under the TA was dependent on the provisions of the electricity act and could not be undertaken in parallel. The 8-month period allowed for TA implementation was grossly inadequate given the broad scope, the amount of detail expected, and the consultation with senior Government officials required to develop the confidence and sense of ownership needed for acceptance and implementation. The implicit assumption that private sector investment in the hydropower development would be necessary in Bhutan in the near future reflected another design weakness. By the time the TA was approved in December 1998, the Government of India already had begun building the Tala hydropower project, a 1,020-megawatt (MW) facility that would triple generating capacity to a level far exceeding Bhutan’s medium-term requirements. The TA design did not take this into account.

12. TA 3307-BHU was to assist the transition of the utility operations of DOP from a government department to a corporation. To achieve this, the consultants were required to (i) undertake an asset valuation; (ii) recommend asset, liability, and equity structures and other financial arrangements to ensure the financial viability of the new corporation; (iii) establish tariff levels based on long-run marginal costs and the financial projections of the new corporation; (iv) facilitate corporate registration; (v) formulate the organization structure of the new corporation; (vi) finalize a human resource development program; and (vi) provide training in commercial accounting, corporate and financial management, and tariff setting using training courses from the Royal Institute of Management in Thimphu. The TA design was considered appropriate since the Government lacked the capacity and experience to transform DOP. However, the TA lacked a provision for international consultant support after December 2001,<sup>6</sup> even though, at the time of approval of the TA, corporatization of DOP was not planned until 1 July 2002. The

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<sup>6</sup> The TA budget allowed for 20 person-months of international consulting input provided over an 18-month period from July 2000 to December 2001.

timing between the TA implementation and planned corporatization of DOP could have been matched better.

## **B. Engagement of Consultants**

13. Consultants for the three TAs were selected in accordance with ADB's *Guidelines on the Use of Consultants*. TA 3112-BHU and TA 3307-BHU used the same consultant, thereby providing continuity through familiarity with the work as well as the cultural and institutional situation. However, the Government expressed concerns to the OEM about its lack of involvement in consultant selection. The Government would like to be more involved in the selection of consultants for future TAs rather than simply being asked to ratify ADB's choice of consultant on a "no objection" basis.

## **C. Organization and Management**

14. For the three TAs, DOP provided project-related information, counterpart support, secretarial services (as required), and local communications. For TA 3112-BHU and TA 3307-BHU, the Government also established a steering committee with representatives from DOP and other Government agencies including the Ministry of Trade and Industry, Ministry of Finance (MOF), Ministry of Planning and the High Court. The OEM found these arrangements appropriate. The Government, however, indicated to the OEM that it was not fully satisfied with the level of counterpart involvement. The Government acknowledged responsibility for this situation. One problem appears to have been that counterpart staff generally came from middle management, whereas the strategic nature of the TAs required extensive consultation with more senior management, who were often not available. The Government and BPC now recognize the importance of counterpart involvement at the senior management level during TA implementation. The measures taken to address this issue in the formulation of future TAs include extending the period for TA completion and asking TA consultants to agree to a work plan at the beginning of the process that fits counterpart management commitments.

## **D. Implementation Schedule and Financing Arrangements**

15. TA 2400-BHU was to be completed in January 1997, and a draft final report was submitted in accordance with this schedule. Following the tripartite meeting attended by the Government, the consultant and ADB in February 1997 and at the request of DOP, ADB and the Government agreed to extend the scope of the work to provide for further training of DOP staff and also to provide hardware and software support for a limited period. The final report was completed in March 1997.

16. TA 3112-BHU was to be undertaken between July 1999 and March 2000. A draft final report was submitted in February 2000. Fundamental philosophical issues that underpinned the consultant's recommendations seemed to dominate the discussion among the Government, the consultant and ADB following the submission of this report. The consultant then agreed to prepare a second draft final report. In May 2000, the consultant for TA 3112-BHU was appointed to undertake TA 3307-BHU, which was, in reality, an extension of the previous TA. The completion of the first TA overlapped with the start of the second. This overlap, together with the need for a second round of reviews, might have contributed to delays in completing the final report, which was not submitted until October 2000.

17. TA 3307-BHU was to be implemented between June 2000 and December 2001, and most of the work was completed on time. The Government, the consultant and ADB met in

November 2001 to discuss the draft final report. However, a second draft final report again was necessary, and the final report was not submitted until May 2002.

18. All TAs were completed within the budget. TA 2400-BHU cost \$392,000, 2% lower than the approved amount of \$400,000. Mainly because of savings in local currency costs and unused contingency funds, TA 3112-BHU was completed for \$433,518, 15% lower than the approved amount of \$500,000. TA 3307-BHU cost \$597,745, slightly below the approved amount of \$600,000.

## **E. Supervision**

19. DOP set up a TA coordination unit to act as the counterpart to the TA consultant. Staff of this unit were responsible for interacting daily with the consultant. However, as indicated in para. 14, the steering committee did not provide the consultant with the intensive senior management input that a strategic project of this importance demanded. This was apparent in the TOR for TA 3112-BHU, which required critical policies to be developed and laws and regulations to be drafted quickly.

20. ADB staff members were involved extensively throughout the implementation of the TAs, especially TA 3112-BHU and TA 3307-BHU. ADB reviewed in detail the interim and final reports and participated in the meetings with the Government and the consultant that followed the reports' submission. In both TAs, two draft final reports were needed before the TA report was finalized. The TCR for TA 3112-BHU noted:

It should be recognized and allowance be made that ADB staff input will increase with the complexity of a project and that this will impact on staff resources. Further the project department's in-house expertise cannot cover all facets of a TA project and that more and more, supporting departments such as the Office of the General Counsel (OGC) will be called upon to assist in the review of legal or other documents generated by the project. It took three reviews by OGC of the electricity act plus two versions of the draft final report before the final report was acceptable to ADB.<sup>7</sup>

In spite of these reviews, the Government made important changes to provisions of the final act without prior concurrence of ADB after the completion of TA 3112-BHU. This was not reflected in the TCR, indicating inadequate monitoring of the impact on the final output.

## **III. EVALUATION OF OUTPUTS AND IMPACTS**

### **A. Adequacy and Quality of Reports and Services Provided**

21. **TA 2400-BHU.** The main services provided by the consultant under this TA were (i) the development of a commercially based accrual accounting system manual; (ii) installing a computer system for billing, collection and consumer accounting, general ledger, and fixed assets accounting; (iii) calculating the long-run marginal cost (LRMC) of the domestic electricity supply; and (iv) developing a tariff plan, based on voltage levels and consumption patterns, that would better reflect the cost of supply to different consumer classes and, in time, would reduce Government subsidies for electricity distribution. However, the computer system was installed only on a pilot basis because DOP, which was still being funded through the national budget, continued to use the Government's cash accounting system as its primary accounting tool. After

<sup>7</sup> ADB. 2001. *Technical Assistance Completion Report on Policy and Legal Framework for Power Sector Development in Bhutan*. Manila.

the consultant withdrew, DOP staff stopped using the new computer system due to software limitations and the low priority accorded to a pilot system not required for management purposes.

22. The national tariff study presented a comprehensive analysis that considered all aspects of the TOR. The TA report, while acknowledging the Bhutan power industry's unique situation, accepts the premise that the baseline tariff should be determined by the LRMC of supply. The export or opportunity cost of generation should be used as a proxy for the LRMC of generation. On this basis, the Government subsidy is defined as the difference between the consumer price and the tariffs that would apply if they were set by the LRMC. The tariff structure proposed under this TA formed the basis for the current BPC consumer price structure, which differentiates consumers by the voltage at which they receive electricity. The BPC structure also incorporates a three-block, progressive tariff structure for low-voltage consumers.

23. The accounting system installed under TA 2400-BHU was extended using savings from TA 2912-BHU (footnote 3). The extension included upgrading the three modules provided under TA 2400-BHU and developing and supplying additional modules, including ones for (i) cash and bank deposits, (ii) accounts payable, (iii) purchases, (iv) inventory, and (v) energy accounting. The implementation of a computerized accrual accounting system has been much more complex than originally envisaged. The billing collection and customer accounting module, currently used in 11 of BPC's 20 revenue accounting centers, will be rolled out to the remaining 9 centers by 31 December 2003. BPC staff members in Thimphu are developing accounting processes using the remaining modules. In line with BPC's new strategic plan, the accounts are to be migrated to the computerized system by 31 December 2004. In the meantime, while revenues are being accounted for on an accrual basis, expenses are being accounted for on a cash basis using the old system inherited from DOP.

24. The consultant developed the accounting system under both TAs to meet DOP and BPC requirements. However, as the OEM was informed, the software was not user-friendly and required specialist operators. DOP suggested the purchase of generic software instead, which was not considered a viable solution. ADB advised DOP to work with the consultant to make the modules workable for DOP staff. Eventually, the consultant proposed an expensive maintenance contract, which DOP rejected. After the completion of the TAs, BPC customized the system by developing additional software modules. Still, some of the modules—such as purchase and inventory—seemed difficult to implement.<sup>8</sup> BPC has written to the consultant regarding these problems, but has received no response and may develop its own software.

25. **TA 3112-BHU.** The development of the draft electricity act was the most important output of this TA. After refinement by the Government, the National Assembly passed the act in July 2001. The key organizational recommendation of the TA was the division of DOP into three entities: Bhutan Electricity Authority (BEA) as the sector regulator; BPC as the transmission and distribution company; and Department of Energy (DOE) as the policy-making body. These organizational changes have been implemented<sup>9</sup> since the passage of the act. The creation of

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<sup>8</sup> The TA 3307-BHU consultant, whose TOR included helping DOP strengthen its accounting and finance section, advised ADB of these software problems. However, ADB staff in a memo dated 8 June 2001 requested that the consultant "cease its insistence on scrapping the modules provided under TA 2912-BHU. As mentioned on a number of occasions in the past, DOP will use the modules until they can be either expanded or superseded sometime after corporatization. Until such time, [the consultant] should refrain from negative statements on the modules and instead concentrate on providing constructive suggestions (if any) so the Project can move forward."

<sup>9</sup> DOP was divided into DOE and BPC in July 2002. BEA, established as a division within DOE with five staff members, will become an independent body and fully functional by the end of 2004 after the necessary subsidiary regulations and staff resources are put in place. Under the act, the Board of Commissioners of BEA will be appointed by the minister of trade and industry.

Druk Hydropower Corporation (DHPC) by merging government-owned corporations that operate the major hydropower facilities in Bhutan was another important recommendation. The formation of DHPC will be studied further in an advisory TA attached to a new loan.<sup>10</sup>

26. The consultant's final report included two versions of the act, an omnibus and a non-omnibus version. The omnibus version contains all the laws relevant to the restructuring of the industry; the nonomnibus version relies on existing legislation for support. The consultant recommended that an omnibus act be created due to concerns that the weakness of the Bhutan legal system, particularly the Bhutan Companies' Act, does not adequately protect the Government's interest in hydropower generation. The nonomnibus version of the act was included only after the Government withdrew its support for the omnibus version, and ADB ceased to insist on an omnibus solution. After the completion of the TA, the Government made changes to the draft act before the National Assembly passed it.

27. The electrical codes of practice and the hydropower development policy were the other two outputs of the TA. The electrical codes of practice were detailed technical codes rather than the implementation rules and regulations required to support the enactment of the act. Furthermore, they covered only low-voltage installations and were based on New Zealand requirements that did not reflect local practices, which are based on Indian standards adapted to meet Bhutan's conditions. The hydropower development policy identified the major risks associated with private sector involvement in the development of the subsector and considered how these risks should be allocated among the contracting parties. However, the policy did not consider more fundamental issues of hydropower development such as environmental policy, processes, and issues related to the granting of water rights, and the possible payment of royalties to the Government for water use.

28. **TA 3307-BHU.** The TA outputs included (i) a corporatization action plan; (ii) a valuation of the asset base of BPC; (iii) a tariff adjustment program to ensure the sustainability and financial viability of BPC; (iv) a human resource plan; and (v) recommendations for developing BPC's financial management systems. The TA report was a comprehensive and detailed blueprint for the establishment of BPC, providing a useful reference for the Government in implementing the corporatization process. However, the Government did not accept many of the consultant's recommendations. In the consultant's complex model, BPC's commercial relationships were defined by comprehensive, legally enforceable contracts and commercial risks were identified and carefully allocated. The model was designed to ensure the long-term financial viability of BPC, while providing an organization structure suitable for future private sector involvement. The Government adopted instead a much simpler approach, which is not likely to be adequate unless all parties are government-owned. Furthermore, the Government has not implemented fully the tariff increases recommended in the report. Nonetheless, with the establishment of BPC on 1 July 2002, one of the main objectives of the TA was substantially achieved.

## **B. Institution Building and Reform**

29. When the TAs were formulated, Bhutan had only one large hydropower station (Chhukha), which was operated by a self-contained, state-owned corporation established under the Bhutan Companies Act. Funding for additional large hydropower projects had not been

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<sup>10</sup> The TA consultants believed that the formation of DHPC would allow specialist skills to be shared by all hydropower stations and optimization of the operation of the different hydro stations to maximize export revenues from the sale of electricity. Currently, electricity for export is available only from the 336-MW Chhukha plant in the west and the 60-MW Kurichhu project in the east. Potential optimization opportunities are limited, at least until the 1020-MW Tala hydropower project is commissioned in 2005.

finalized, and the development of hydropower generation likely depended on the Government's ability to attract private international investment. DOP was responsible for the domestic electricity supply, while ownership and operation of the transmission network was split between Chhukha Hydropower Corporation (CHPC) and DOP. The TAs were designed primarily to increase the financial and economic sustainability of the sector and create an industry structure and environment conducive to private sector involvement.

30. TA 3112-BHU recommended an industry model designed to meet these objectives. The model included (i) drafting an omnibus electricity act that would protect the Government's interests in electricity generation and address perceived weaknesses in Bhutan's legal system by consolidating all relevant industry law; (ii) consolidating the Government's hydropower interests into a single corporation (DHPC) that could maximize revenue from electricity exports and make better use of the limited number of skilled technical and management personnel; (iii) making BPC responsible for all transmission and domestic electricity distribution and supply; (iv) making BEA responsible for licensing and for the technical and economic regulation; (v) consolidating transmission services by transferring to BPC parts of the transmission network used solely for export purposes; and (vi) progressively increasing domestic electricity prices, bringing them closer to the economic cost of supply, to increase the financial sustainability of the domestic electricity supply and reduce Government subsidies.

31. Progress in institutional reform has been slow. The National Assembly passed the nonomnibus act, though it has not gone into effect. As a result, the legal environment has not changed. DHPC has not been formed, and all large hydropower projects are independently managed by government-owned corporations. BEA is still being operated as a division of DOE. Tariffs have been restructured, though tariff increases have fallen short of the levels recommended by the TA. The most tangible progress has been in the consolidation of transmission assets and the corporatization of DOP's utility function through the establishment of BPC on 1 July 2002. While the legal and contractual structure underpinning BPC is weak and suitable only for an environment where major contracting parties, such as energy suppliers are government-owned, BPC appears to be very well managed. The slow pace of tariff adjustments remains a concern for ADB, however.

### **C. Performance of Consultants**

32. After completion of the TAs, the Government and ADB rated the performance of the consultants as satisfactory. However, BPC informed the OEM that the accounting software provided by the TA 2400-BHU and TA 2912-BHU was not user-friendly. Also, the industry models produced by the TA 3112-BHU and TA3307-BHU consultants were overly complex and did not take due account of the wishes of the Government or the unique nature of the power sector in Bhutan. In view of these inadequacies, the OEM concluded that the performances of the consultants under TA 2400-BHU and TA 3112-BHU were partly satisfactory and performance of the consultant under TA 3307-BHU was satisfactory.

### **D. Impact of TAs**

33. The major impact of the TAs was the establishment of BPC. DOP was instrumental in bringing about the institutional changes. Nonetheless, the benefits of the organization change have not been realized fully. The Government is committed to this change, and considers the TAs useful in selling the concept of industry change to MOF and the National Assembly. For this reason alone, the Government considers the TAs highly successful. The Government is also committed to establishing BEA as a separate regulatory body. Work is ongoing on the

development of the implementing rules and regulations, which will underpin the operation of BEA.<sup>11</sup> Furthermore, while differences remain between ADB and the Government on tariff reform, progress has been made. At the time of the TAs' formulation, all users paid the same price for electricity. Electricity prices<sup>12</sup> now reflect connection voltage and consumption levels, generally in accordance with the recommendations of the national tariff study undertaken under TA 2400-BHU. Prices also have increased, although not as much as recommended by the TAs. While BPC recognizes the need to raise electricity prices, the tariff proposals have met strong political and consumer resistance. The OEM was in Bhutan for the launch of BPC's 2003 corporate strategic plan, which reflected an impressive amount of modern business management ideas. The targets in this plan are very ambitious.

34. The TAs had limited impact on promoting private sector participation in the power sector. However, since the TAs formulation, bilateral aid financing for ongoing hydropower development has been forthcoming to such an extent that private sector investment in the subsector is much less likely in the medium term. If such investment does occur, the investor would probably take the full commercial risk and negotiate its own power sales agreements with buyers in India (or possibly Bangladesh).

#### IV. OVERALL ASSESSMENT

35. The Government rated the three TAs, assessed as a whole, as highly successful because they provided a useful starting point and body of reference for the establishment of BPC. In particular, the TA reports were effective in assisting the corporatization of DOP and the restructuring of the power sector. The OEM rated TA 2400-BHU and TA 3112-BHU as partly successful and TA 3307-BHU as successful. The detailed assessment of each TA in terms of relevance, efficacy, efficiency, sustainability, and other impacts is provided in Appendix 2.

36. **TA 2400-BHU.** The computerized accounting system, one of the principle components of the TA, was installed only as a pilot system that operated in parallel with the Government's standard cash accounting system. Soon after installation, DOP staff stopped using the new system due in part to software problems. Because it was a pilot system that was not required for day-to-day operations, it was not seen as a management priority. The system was upgraded and extended under TA 2912-BHU. However, the upgraded system still was not user-friendly, requiring the correction of software problems and the development of additional modules to meet BPC requirements. The ongoing implementation of the system may not be completed until the start of FY2005. The national tariff study, on the other hand, was comprehensive and formed a sound basis for work on the appropriate price of domestic electricity. The current domestic electricity price structure is based on the work completed in this TA. The TA is assessed partly relevant, less efficacious, and less efficient with its outcome likely sustainable and bearing moderate other impacts. Overall, the TA is rated partly successful.

37. **TA 3112-BHU.** Two of the main recommendations of this TA were the corporatization of the utility function of DOP and the establishment of BEA as the sector regulator. The Government implemented these recommendations, and BPC was established on 1 July 2002.

<sup>11</sup> The Government has been developing the implementing rules and regulations since the middle of 2002 with a TA funded by the Norwegian Development Assistance Division (NORAD). Development of these rules and regulations involved an extensive, three-stage consultation process. The Government is negotiating another NORAD-funded TA, which will start in January 2004 and last for 4 years, to develop detailed regulatory processes and support BEA during the initial years of its operation.

<sup>12</sup> A distinction between the domestic tariff and the consumer price was made under TA3307-BHU, which was recommended that the tariff be the economically efficient tariff and be subject to approval by the BEA. The price was to be set by the Government, which would pay the difference to BPC as a subsidy.

The other main recommendation regarding the formation of DHPC has not been accepted fully by the Government, and will be subject to further study. The act, which the National Assembly passed, is awaiting promulgation by the minister of trade and industry. However, one of ADB's main objectives—establishing a framework for private sector participation in hydropower development in Bhutan—probably has not been achieved. The need for such participation has receded since the TA was formulated. In hindsight, the TOR was too ambitious for an 8-month implementation period and, as a result, the TA did not develop implementation rules and regulations or a meaningful hydropower policy as expected. Furthermore, the technical codes produced were limited in scope and did not take sufficient account of current practices in Bhutan. The incomplete work will be undertaken under subsequent TAs, funded by ADB and other aid agencies, with wider consultation and over a longer time frame. The TA is assessed relevant, less efficacious and less efficient with its outcome likely sustainable and bearing moderate other impacts. Overall, the TA is rated partly successful.

38. **TA 3307-BHU.** The detailed action plan and resource manual for the corporatization of the utility functions of DOP, both provided under the TA, were critical to the process that culminated in the establishment of BPC. While the industry model developed under the TA has been described as too complex, the simplified commercial arrangements now in place arguably do not allow for private sector participation as envisaged at the time of TA formulation. The issues of consumer prices and transparent government subsidies for domestic electricity supply and distribution still have to be resolved. However, BPC is being very competently managed and many of the objectives of corporatization, such as increasing the focus on revenue collection, are being achieved. The TA is assessed relevant, efficacious and efficient with its outcome most likely sustainable and bearing moderate other impacts. Overall, the TA is rated successful.

## V. CONCLUSIONS

### A. Key Issues

39. A number of issues relevant to the future of ADB's operations in the power sector in Bhutan were identified.

#### 1. Effectiveness of Financial Covenants

40. About half of BPC's operating income is from wheeling charges paid by hydropower corporations for power exported using BPC transmission lines. This proportion is likely to increase so substantially after the commissioning of the Tala project in 2005 that the revenue from wheeling electricity sold for export could overwhelm revenue from the domestic electricity supply. When the price increase for domestic electricity was deferred from 1 July 2002 until 1 January 2003 due to political and consumer resistance, the Government increased the wheeling charge to Nu0.175 per kilowatt-hour (kWh) from Nu0.125 per kWh to compensate for the reduction in revenue.<sup>13</sup> This indicates the Government has the ability to manipulate BPC revenues and ensure that BPC can meet its financial commitments, including ADB loan covenants, irrespective of domestic tariffs. Hence, loan covenants are not likely to be effective in ensuring that BPC raises its domestic electricity prices closer to financially and economically sustainable levels.

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<sup>13</sup> The wheeling charge was reduced to Nu0.125 per kWh when the increase in domestic electricity prices was introduced on 1 January 2003.

## 2. Domestic Electricity Prices and Subsidies

41. The national tariff study undertaken under TA 2400-BHU and the financial analysis undertaken under TA 3307-BHU were predicated on an economically efficient domestic tariff, calculated using the export price for electricity generation and the LRMC for transmission and distribution. Subsidies are considered necessary in the short term, but should be phased out over time.<sup>14</sup> TA3307-BHU recommended an economically efficient domestic tariff, subject to approval by the BEA, while the Government sets the consumer price and pays the difference to BPC as a subsidy. However, the high cost of rural distribution in Bhutan means that basing the domestic tariff on opportunity cost and LRMC, and phasing out subsidies over time, will result in a much higher domestic price. This would place BPC in a very strong financial position as demonstrated by the financial model for BPC developed under TA 3307-BHU. In 2010, this model predicts (i) a return on capital of 12% compared with a weighted average cost of capital of 7%; (ii) a debt service coverage ratio of 2.7% , and (iii) a 3-year, self-financing ratio of 126%. This performance is far better than required to meet ADB's financial covenants. The Government strongly opposes this standard approach to setting economically efficient prices, arguing that the domestic generation tariff should be based on the cost of generation rather than the export price or opportunity cost. The Government believes that ADB's standard approach to tariff issues fails to account adequately for the uniqueness of Bhutan's power sector.

42. The Government's vision of providing all households access to electricity by 2020 is based on social and environmental, rather than economic, considerations. Indeed, the economic benefit of rural electrification is always going to be limited. Given the mountainous terrain and dispersed population, the development of a comprehensive road network in the medium term is impractical. Therefore, transporting products to market will be difficult. If the premise is accepted that the primary objectives of rural electrification are social and environmental, not economic, then the cost-benefit analysis of rural electrification should take into account social and environmental benefits. Based on this premise, one approach to setting domestic electricity tariffs would be to base consumer prices on the economic costs of urban, and possibly semi-urban, electrification. The additional costs of rural electrification would be treated as a social subsidy. Extending this model, it should be possible to maximize the benefits of Government total spending on social development by developing methodologies for comparing rural electrification with other social service projects.

43. The domestic electricity price for low-voltage consumers is broken down into three progressive blocks. The first block is a lifeline rate for the basic electricity needs (primarily lighting) of poor and marginalized consumers. The electricity price increases for consumption above 80 kWh per month; it increases even more for consumption above 200 kWh per month. Many countries use this approach because it discourages excessive use of electricity, consistent with the overriding objective of minimizing per capita energy consumption. As shown in Appendix 1, Bhutan has the highest per capita energy consumption in the region due to the extensive use of fuelwood in rural areas for cooking, space heating, and water heating. Government policy encourages the substitution of fuelwood with electricity in rural areas to reduce deforestation. Since electricity is a much more efficient energy source than fuelwood, this policy is likely to reduce per capita energy consumption. To support this policy, the Government does not levy sales tax on rice cookers or water boilers. In reviewing the work done under the TAs, the OEM did not see any analysis to indicate that a progressive price structure for the sale of electricity in rural areas is consistent with this environmental objective.

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<sup>14</sup> The domestic electricity price, averaged across all classes of consumer, is approximately Nu0.85 per kWh, the lowest in the region.

### 3. Ongoing Development of the Power Sector

44. Since the completion of TA 3307-BHU, the Government has been working with the Norwegian electricity regulator to develop the implementation rules and regulations that will underpin the operation of BEA. This project, funded by the Norwegian Development Assistance Division (NORAD), began in mid-2002 and the final implementation rules and regulations should be available in the last quarter of 2003. Thus, how BEA will operate is not known yet. Furthermore, the Government recently signed a grant aid agreement with the Government of Japan to prepare a master plan for rural electrification. This work should establish the cost of providing electricity to all households in the country and determine whether the Government's target of achieving this goal by 2020 is feasible. It should also provide the information necessary to determine the medium-term impact of rural electrification on the financial position of BPC.

45. ADB is processing two more TAs to support the development of the power sector, both of which will be attached to a new rural electrification loan. The first TA will support the development of BEA by (i) determining the institutional and technical capability needs of BEA, (ii) developing a short- and medium-term training program for BEA staff and its stakeholders, (iii) assisting BEA in developing technical standards and codes, and (iv) designing and implementing a national outreach strategy that will raise consumer awareness of BEA and its role as sector regulator. The TA will be complemented by a new aid project that the Government is negotiating with NORAD to assist BEA in developing detailed operating procedures for licensing, economic regulation, and dispute resolution. The NORAD project, which is expected to run from January 2004 through 2007, will support BEA in its initial years of operation. The TORs for the two undertakings have been designed to avoid overlap and conflict. The second proposed TA will support the establishment of DHPC. The Government emphasized to the OEM, however, that it has not decided whether to form DHPC. If the proposed TA does not establish a strong case for proceeding, the Government plans to terminate the TA.

#### B. Lessons Identified

46. The implementation of a computerized accounting system was much more complex than commonly envisaged. Another recently completed operations evaluation study found similar difficulties.<sup>15</sup> The reasons for the generally unsuccessful outcomes in both cases were also similar. First, before installing new accounting software, the governments should agree that the new accounting system, when operational, can replace the one currently in use. In the two cases reviewed, each government found the new software did not meet its detailed reporting requirements. As a result, the governments were expected to keep two systems operating in parallel, with the predictable result that the new software soon became superfluous and was not used. Second, accounting software requires customization to meet an organization's specific requirements. Accounting knowledge and skilled information technology support are required on an ongoing basis as many problems are not apparent immediately after system installation. Third, and perhaps most important, government departments usually focus on cost. Prior to corporatization, they need assistance with the implementation of systems that focus on revenue collection, rather than a new computerized accrual accounting system. In both cases, the cost accounting systems in use were adequate for cost reporting purposes—at least for the initial period of corporatization—and did not need to be replaced as a result of corporatization. Although they were cash-based, period-end accrual adjustments could be made before the accounts were finalized. The counterpart organizations really needed a computerized billing system, and support in the development and implementation of systems and procedures to

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<sup>15</sup> ADB. 2003. *Project Performance Audit Report on the Power Rehabilitation Project in Cambodia*. Manila.

follow up on unpaid accounts. Specifically, DOP needed assistance in identifying and reducing nontechnical losses. For example, BPC discovered that it was losing a lot of revenue because many customers are not metered and others have burned-out meters. Had the TOR for TA 2400-BHU focused on all aspects of improving revenue collection, rather than simply on financial accounting, this problem could have been identified and acted on before the utility functions of DOP were corporatized.

47. The Government believes that, while the TAs provided an overall vision for power sector reform, many of the detailed models developed under the TAs failed to account sufficiently for the unique characteristics of the Bhutan electricity industry. More specifically, the Government found that the models did not fully recognize that (i) the power sector, unlike those in many other countries, is unsubsidized and highly profitable overall; (ii) private participation in the hydropower subsector is unnecessary in the medium term; and (iii) rural electrification is particularly expensive in Bhutan and is being carried out primarily for social and environmental reasons, rather than economic ones. The Government, therefore, has decided to adopt only the TA recommendations it believes are appropriate. In addition, the Government has signaled that it intends to assume greater control over future TAs. This suggests that more attention should be paid to local characteristics and conditions at TA formulation and during implementation. Further, the results indicate the importance of counterpart involvement at the senior management level during TA formulation and implementation<sup>16</sup>.

48. Given the limited time available in TA 3112-BHU, solutions developed elsewhere were used to meet the Government's perceived requirements. Time allowed for counterpart feedback was also inadequate, and the Government had little sense of ownership for much of the work. In the end, much of the scope of the TOR, such as the development of a hydropower policy and preparation of technical standards, will be redone under future ADB-funded TAs. The Government has shown dissatisfaction with a "pressure cooker" approach to the delivery of TA outputs. In the design of future TAs for Bhutan, ADB will need to be sensitive to such issues and realistic in designing TOR with respect to the time and resources available.

### **C. Follow-Up Actions and Recommendations**

49. Efforts to increase domestic electricity prices face political and consumer resistance in Bhutan. The arguments against raising prices are that (i) the electricity sector overall is highly profitable and sustainable, and (ii) increased electricity consumption in rural areas is consistent with the Government's environmental objectives. The Government and ADB should agree on an acceptable increase in domestic electricity prices, recognizing that the political argument for raising domestic prices is weaker than in many developing countries. The immediate objective of that discussion could be to agree on some fundamental issues related to setting domestic electricity prices, including (i) the basis on which economic tariffs should be assessed, and (ii) whether the Government should continue subsidizing domestic electricity prices over the medium term.

50. As discussed in para. 40, standard financial loan covenants may not be effective indicators of the efficiency of electricity supply or of the effectiveness of industry reform in Bhutan. To address this issue, TA 3307-BHU recommended that the subsidy for electricity distribution be transparent and paid as a specific subvention. The Government has not accepted this recommendation, indicating instead that it will set the wheeling charge for electricity exports at a level that ensures BPC meets its loan covenants. As a result, the subsidy on the domestic

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<sup>16</sup> For the new TAs, BEA and DOE are requested to prepare the first draft of the TA paper and review the expressions of interest from the shortlisted consulting firms.

electricity supply is likely to be hidden and the efficiency of the domestic electricity supply could be difficult to measure. BEA should monitor this situation and encourage efficient operation, but how it plans to do this will not be known until implementation rules and regulations are published. ADB should monitor the effectiveness of BEA in ensuring that Bhutan's domestic electricity supply operates efficiently.

## OVERVIEW OF THE BHUTAN ELECTRICITY SECTOR

1. Electricity was introduced to Bhutan in 1960s, when the first diesel generators were installed. In 1967 the first mini-hydropower plant was commissioned, followed by the development of additional mini-hydro plants, all with the assistance of the Government of India. From 1969 to 1972, districts in southern Bhutan began receiving electricity through interconnections with the grid of the Assam State Electricity Board of India and the West Bengal State Electricity Board of India.
2. Bhutan achieved a major development objective in 1986 when the first unit of the 336-megawatt (MW) Chhukha hydropower project was commissioned. India financed the project with a grant and a loan. In return, India receives Chhukha's excess electricity for 99 years at a mutually agreed price that is effectively a royalty on excess power generated. The operations evaluation mission (OEM) was advised that a legally enforceable contract for the sale of electricity to India does not exist. The arrangement, which is mutually beneficial, relies on the goodwill of both parties. In 1995, at the time of approval of TA 2400-BHU, Chhukha power was sold to India for Nu0.5 per kilowatt-hour (kWh). By 2003, the sale price had risen to Nu1.5 per kWh, a price that is substantially higher than the estimated cost of generation of Nu0.21 per kWh.<sup>1</sup>
3. Chhukha and subsequent large hydroelectric power stations constructed in Bhutan are run of the river. While this arrangement has substantially less environmental impact than schemes requiring large dams, the available output at any point in time is determined by the river flow. As a result, the firm capacity of Chhukha is only 67 MW. Furthermore, low river flows occur in winter, which coincides with peak electricity demand. At the time of approval of TA 2400-BHU in 1995, the electricity supply-and-demand balance was marginal. Peak demand was about 70 MW, roughly the same as the firm capacity of installed hydropower generation. Because the transmission system was not fully interconnected, some of the load was supplied from diesel generation or by the importation of electricity from the India. Although negotiations for additional projects were held, no agreements were reached. That raised the possibility that private investment might be needed to ensure the ongoing development of hydroelectric generation in Bhutan.
4. Hydroelectric generation has improved greatly in recent years with the increased support from India and other sources of assistance. The Kurichhu 60-MW hydropower station, one of the projects funded by India, was commissioned in 2001. The 24-MW upper Basochhu hydropower station, which was funded by the Government of Austria, was commissioned in 2002. The 40-MW lower Basochhu hydropower station, also funded by Austria, is under construction and due for commissioning in early 2005. More significantly, the 1020-MW Tala hydropower station, funded by India, is under construction and due for commissioning in 2005. Taken together, these stations will provide a firm capacity of 250 MW, compared with a current domestic load of less than 100 MW.
5. The Government of Bhutan expects to reach an agreement with India for funding the construction of Punatsangchu 1 (870 MW) and Mangdechu (360 MW) hydropower stations. Power from these stations will be evacuated over a 400-kilovolt (kV) transmission line running to Delhi, thereby overcoming transmission constraints in northern India. Transmission constraints have been seen as a limitation on the sale of Bhutan-generated electricity to India. With the development of these proposals, private sector involvement in hydropower generation for

<sup>1</sup> In the Report and Recommendation of the President for Loan 1375-BHU, the cost of generation at Chhukha was estimated to be Nu0.21 per kWh given the capital cost of Nu2.445 million.

domestic consumption is unlikely in the medium term. However, the Department of Energy (DOE) indicated to the OEM that a private sector proposal to supply the Indian grid is a possibility. Such a proponent would sell power directly to Indian (or Bangladeshi) customers, either through a power purchase agreement or as a merchant plant. The Government would not be involved in the transaction, though it would receive a royalty for the use of its water.

6. Each large hydropower station is independently managed by a government-owned company registered under the Bhutan Companies Act 2000. This has resulted in some fragmentation of electricity planning. For example, the long-term transmission plan does not show a connection between the proposed 220-kV transmission line from the proposed Punatsangchu 1 and Mangdechu hydropower plants and the extended 220-kV domestic grid serving the east of the country, even though the distance between the two networks is not great. TA 3112-BHU recommended aggregating the individual hydropower generation companies to form the Druk Hydropower Corporation (DHPC). The aim would be to (i) achieve greater coordination, (ii) make better use of human resources, (iii) optimize the use of the different power stations to supply domestic demand, and (iv) maximize export revenue from electricity sales to India.

7. Bhutan has two transmission grids. In the west of the country, a 220-kV primary grid runs between Thimphu, Chhukha hydropower plant and the Birpara substation in India. A 66-kV secondary transmission grid interconnects the main load centers in most provinces in eastern Bhutan. In the east and center of the country, the primary grid is 132 kV and secondary transmission is 33 kV. Until the formation of Bhutan Power Corporation (BPC) on 1 July 2002, the government-owned Chhukha Hydropower Corporation (CHPC), which owns and operates the Chhukha hydropower project, controlled the 220-kV grid. However, these transmission assets have been transferred to BPC, which receives from CHPC a Nu0.125 per kWh wheeling charge on power sales to India. The Ninth Five-Year Plan (2002-2007) proposes interconnecting the two grids through the construction of a 220-kV line between Thimphu in the west and Chowabari in central Bhutan. Funding for this line has not been arranged.

8. BPC is responsible for all power transmission within Bhutan, including transmission for export, for distribution and supply to domestic customers, and for the mini-hydro, micro-hydro, and diesel generation that supplies customers not connected to the two main transmission grids. Approximately 60% of its sales are to large industrial customers directly connected to the transmission grid. Those customers sell their products into the Indian market, taking advantage of the low electricity tariffs in Bhutan. A further 15% of energy sales are to smaller industrial customers that receive supply at medium voltage. The remaining 25% of sales are to low-voltage customers, 80% of whom live in urban areas. Hence, rural customers account for only 5% of sales. Only about 35,000 of approximately 100,000 potential customers in Bhutan have electricity.

9. As set out in the Vision 2020 document, the goal is for all households to have access to electricity by 2020. To this end, the Government is planning to provide electricity to an additional 15,000 houses during 9FYP. However, rural electrification in Bhutan poses huge problems. It is a country with a mountainous terrain and a highly dispersed population. It has been estimated that up to 80% of the population live more than an hour's walk from a road and up to 50% live more than one day of walking from a road passable to motor vehicles. Rural electrification is, therefore, expensive with an estimated cost per customer of \$1,600 per household. The Government recently signed an agreement with the Government of Japan for the preparation of a rural electrification master plan, which will be completed by the end of 2005. The master plan is expected to estimate the total cost of rural electrification and consider issues such as which

parts of the country can be supplied economically by a grid connection and which parts will require off-grid solutions.

10. Despite its high cost, rural electrification has the potential to deliver significant environmental benefits by reducing the use of fuelwood and the rate of deforestation. Bhutan has one of the highest energy consumption rates in the region. Per capita energy consumption, including non-commercial energy, amounts to 0.8 tons of oil equivalent (toe), compared with 0.027 toe in Nepal, 0.73 toe in India and 0.75 toe in the Philippines. Fuelwood accounts for more than 75% of total energy consumption and for virtually all non-commercial energy consumption in rural areas. The Government has eliminated all taxes on new electric rice cookers and water boilers to help discourage the use of fuelwood and slow deforestation. Despite the current low electricity price and Government policies to discourage the use of fuelwood, rural consumers still use electricity primarily for lighting and are reluctant to use it for cooking and space heating.

11. In 1995, at the time of approval of TA 2400-BHU, consumers paid a flat domestic electricity price of Nu0.5 per kWh. The Government acknowledged the rationale for annual price increases to bring the domestic tariff closer to the long-run marginal cost of supply. As part of a time-bound plan, the aim was to raise the nominal domestic electricity price to Nu1.40 per kWh by 2000. This represented annual increases of 23% in nominal terms and 17% in real terms over the 5-year period. At the same time, the scope of TA 2400-BHU would include a tariff study to determine an appropriate tariff structure differentiated by voltage levels and consumption patterns. All parties agreed that the tariff study could result in adjustments to the previous time-bound tariff plan.

12. Domestic electricity prices have not risen to the extent envisaged in 1995. The latest increase on 1 January 2003 resulted in an electricity price of Nu0.9 Nu per kWh for high-voltage consumers, Nu0.95 per kWh for medium-voltage consumers, and between Nu0.6 and Nu1.0 per kWh for low-voltage consumers. Significantly, these prices are well below the export price, which has risen to Nu1.5 per kWh for power generated by CHPC and Nu1.75 per kWh for power generated by the Kurichhu project. BPC has advised DOE of its intention to increase real electricity prices over a 4-year period ending in 2007, but the Government has not accepted this proposal yet.

13. In July 2001, the National Assembly approved the Electricity Act of Bhutan (the act). Most significantly, the act provides for the establishment of the Bhutan Electricity Authority (BEA), which will be responsible for issuing licenses and for the technical and economic regulation of the industry. However, the act has not gone into effect because the minister of trade and industry has not signed off on it yet. The BEA currently exists as a division of DOE rather than as a separate corporate body as envisaged in the act. The minister of trade and industry does not intend to promulgate the act until its implementing rules and regulations have been finalized. This work is likely to be completed by the second half of 2004.

## TECHNICAL ASSISTANCE RATINGS

### A. TA 2400-BHU: Institutional and Financial Development of the Division of Power

1. **Relevance.** The technical assistance (TA) aimed to develop and implement a computer-based utility accounting system for the Division of Power—subsequently replaced by the Department of Power (DOP)—that would be more appropriate to a corporation than a government's cash accounting system. The TA also aimed to design a domestic tariff structure adequate to support the needs of the power sector. While the TA was consistent with the Government's sector goals and the country operational strategy of the Asian Development Bank (ADB), the computerized accounting system was installed on a pilot basis. As a result, it was not seen as a management priority at the time of TA completion. The tariff study's work on tariff adjustment was timely. The TA is assessed partly relevant.

2. **Efficacy.** The expected outputs and deliverables were largely achieved in accordance with the TA design and scope. However, the computerized accounting system installed under the TA was not fully used after the consultants withdrew due software limitations and the low priority accorded a pilot system not required for management purposes. Only one of the accounting modules developed under the TA is used in 11 of Bhutan Power Corporation's (BPC) 20 revenue accounting centers. That module will be rolled out to the remaining nine centers by the end of 2003. In accordance with BPC's new strategic plan, the accounts are expected to be fully migrated to the computerized system by 31 December 2004. On the other hand, the tariff structure proposed under the TA formed the basis for the current consumer price structure. Overall, the TA is assessed less efficacious.

3. **Efficiency.** Although the TA was completed within the budget, the accounting software installed under the TA did not function properly and required further upgrading and extension using savings from another TA. The TA is assessed less efficient.

4. **Sustainability.** The accounting system developed under the TA was extended using savings from a separate project preparatory TA.<sup>1</sup> The extension included upgrading the three modules provided under TA 2400-BHU as well as developing and supplying additional modules including (i) cash and bank deposits, (ii) accounts payable, (iii) purchases, (iv) inventory, and (v) energy accounting. The tariff increases proposed under this TA have not been fully implemented in the recommended time frame. However, the tariff analysis has resulted in a tariff structure that, while protecting the most vulnerable consumers, better reflects differences in the cost of supply to different consumer categories. With the additional support from ADB and the Government's commitment to sector restructuring, sustainability of the TA outputs and impacts is likely. However, without further extension under TA 2912-BHU, the accounting system was proven unsustainable.

5. **Other Impacts.** The outputs of the TA served as a starting point for the institutional changes that followed. Other impacts are assessed moderate.

6. **Overall TA Rating.** The TA is rated partly successful.

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<sup>1</sup> TA2912-BHU: Second Rural Electrification Project, for \$600,000, approved on 19 November 1997.

## B. TA 3112-BHU: Policy and Legal Framework for Power Sector Development

7. **Relevance.** The TA was designed to assist the Government in establishing a policy and legal framework for the future corporatization of DOP and for private participation in the power sector. The key TA output was the development of the Electricity Act (the act), which the National Assembly passed in July 2001 after further refinement by the Government. The need for private sector participation has declined since the TA was formulated. The TA is assessed relevant.

8. **Efficacy.** The two main recommendations of the TA were the corporatization of the utility function of DOP and the establishment of the Bhutan Electricity Authority (BEA) as the sector regulator. The Government accepted these recommendations, and BPC was established on 1 July 2002. However, the TA did not develop implementing rules and regulations for the establishment of BEA. Furthermore, the technical codes and the hydropower policy produced under the TA were limited and did not take adequate account of current practices in Bhutan. Overall, the TA is assessed less efficacious.

9. **Efficiency.** While the TA experienced significant delays, the TA is assessed less efficient mainly because BEA remains part of the Ministry of Trade and Industry rather than an independent regulatory body. Further, due to time constraints, the implementation rules and regulations and the hydropower policy did not meet the expectations of the TOR. They will be reworked in subsequent TAs.

10. **Sustainability.** Given the Government's commitment to the introduction of an industry structure in line with the TA recommendations, the sustainability of the TA impact is likely.

11. **Other Impacts.** The TA paved the way for the development of Bhutan's power sector. Other impacts are assessed moderate.

12. **Overall TA Rating.** The TA is rated partly successful.

## C. TA 3307-BHU: Corporatization of Department of Power

13. **Relevance.** The TA aimed to assist the transition of the utility operations of DOP from a government department to a corporation. The TA was consistent with the Government's sector goals and priorities and with ADB's country operational strategy. The TA is assessed highly relevant.

14. **Efficacy.** The TA provided a useful reference for the Government in implementing the corporatization process. However, many of the TA recommendations were not followed. The TA provided a complex model that defined BPC's commercial relationships through comprehensive, legally enforceable contracts, and identified and carefully allocated commercial risks. The model was designed to ensure the long-term financial viability of BPC, while providing for future private sector involvement in hydropower development. Instead, the Government adopted a simpler approach, which is likely to be adequate only if all affected parties are owned by the Government. Furthermore, the Government has not implemented fully the tariff increases recommended in the report. Nonetheless, with the establishment of BPC on 1 July 2002, one of the main objectives of the TA has been substantially achieved. Overall, the TA is assessed efficacious.

15. **Efficiency.** The TA was completed within the budget with a moderate delay. The impact of the delay on the substance of outputs was minor. The TA is assessed efficient.
16. **Sustainability.** Given the Government's strong commitment to the success of BPC, sustainability of the TA impact is most likely.
17. **Other Impacts.** The TA provided key inputs to the process that culminated in the establishment of BPC. Other impacts of the TA are assessed moderate.
18. **Overall TA Rating.** The TA is rated successful.