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Energy Policy 2000 Review: Energy Efficiency for a Better Future

Operations Evaluation Department

Asian Development Bank

ABBREVIATIONS

ADB	–	Asian Development Bank
ALGAS	–	Asia Least Cost Gas Abatement Strategy
BOT	–	build operate and transfer
btu	–	British thermal unit
DMC	–	developing member country
DSM	–	demand-side management
EA	–	executing agency
EIA	–	environmental impact assessment
GDP	–	gross domestic product
GEF	–	Global Environment Facility
GMS	–	Greater Mekong Subregion
ICB	–	international competitive building
IPP	–	independent power producers
kVA	–	kilovolt ampere
kWh	–	kilowatt hour
LNG	–	liquefied natural gas
MDG	–	millennium development goal
MW	–	megawatt
O&M	–	operation and maintenance
OAG	–	Office of the Auditor General
OED	–	Operations Evaluation Department
OEM	–	operations evaluation mission
PPA	–	power purchase agreement
PPAR	–	project performance audit report
PRC	–	People's Republic of China
PREGA	–	Promoting Renewable Energy, Energy Efficiency and Greenhouse Gas Abatement
PSOD	–	Private Sector Operations Department
REACH	–	Renewable Energy, Energy Efficiency and Climate Change Program
RETA	–	regional technical assistance
RRP	–	Report and Recommendations of the President to the Board of Directors
RSDD	–	Regional Sustainable Development Department
SES	–	special evaluation study
TOU	–	time of use
TPES	–	total primary energy supply

NOTE

In this report, "$" refers to US dollars.

Key Words

asia, energy, evaluation, energy policy, environment, asian development bank, poverty, energy efficiency, clean energy, governance, corruption, private sector, reform, regional cooperation.

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The guidelines formally adopted by the Operations Evaluations Department (OED) on avoiding conflict of interest in its independent evaluations were observed in the preparation of this report. David Parish and Jindra Samson were the consultants. To the knowledge of the management of OED, there were no conflicts of interests of the persons preparing, reviewing or approving this report.

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EXECUTIVE SUMMARY

The Asian Development Bank (ADB)'s *1995 Policy Initiatives for the Energy Sector* (1995 Energy Policy) emphasized sector reforms to unbundle regulated monopolies and develop independently regulated and privatized energy markets. This was expected to lead to more efficient use of energy, lower costs, and more private investment.

Within the framework of the 1995 Energy Policy, the *Energy 2000: Review of the Energy Policy of the Asian Development Bank* **(**2000 Review) underscored four operational priorities: (i) reducing poverty; (ii) promoting private sector involvement; (iii) addressing environmental impacts; and (iv) promoting regional cooperation. The Regional and Sustainable Development Department requested an independent evaluation by the Operations Evaluation Department to assess the relevance and effectiveness of the 2000 Review to provide an input for a 2007 review of the energy policy and related strategy formulation.

This evaluation was based on the analysis of ADB's operational data, ADB publications, and related literature, evaluation evidence in reports and databases, and country studies covering India, the People's Republic of China and Sri Lanka. Both the 1995 Energy Policy and 2000 Review, similar to other policies developed during this time period, lacked a well-developed design and monitoring framework with clear objectives and monitorable indicators. This made the evaluation difficult because there were no clear criteria against which to judge whether actual outcomes met, exceeded or fell short of expectations.

Key Findings

ADB's operations in the energy sector are generally performing well. The major impacts of ADB assistance include (i) financial and tariff restructuring and lower costs have reduced the need for subsidies and public sector fiscal expenditures for the power sector; (ii) improved quality and reliability of energy supply, a major concern for the domestic private sector and foreign direct investment; (iii) some positive demonstration effects of energy efficiency and renewable energy projects; (iv) some energy efficiency projects have had positive and immediate impacts on improving environmental conditions; (v) governance is improving in the power industry; and (vi) transfer of skills gained from technical assistance in areas such as developing tariffs, automated billing, system planning and management reporting systems. Overall the energy policy is rated "successful". The policy is "highly relevant" and was responsive to changing external environment and to the changing needs of ADB's client countries. It is sufficiently broad to cover the divergent needs in the Asia Pacific Region and is generally consistent with the objectives of the other development partners active in the sector. The effectiveness of the policy was assessed looking at the performance of the sector in relation to the strategic objectives of the 2000 Review: poverty reduction, promoting private sector participation, regional and environment impacts, and regional cooperation.

The focus on poverty reduction as a major driver of ADB's energy sector operations, although relevant, was over emphasized in the 2000 Review. While the evaluation found evidence that some projects were designed to make them more pro-poor and that access to affordable electricity improves the lives of the poor, poverty considerations did not play a major role in project selection. Most of ADB's lending in the energy sector was not directly targeted on the poor. The poverty reduction impact of operations in the energy sector was largely indirect and achieved through trickle down effects of economic growth to which the power sector development makes a significant contribution. There were few targeted interventions such as providing electricity to poor rural households. There is evidence that suggests that interventions

in sectors other than energy have a greater impact on poverty reduction. The effectiveness rating of the poverty reduction objective is “partly effective”, although the objective itself was rated as “relevant”.

The 2000 Review is rated “highly relevant” and “highly effective” in supporting power sector restructuring/unbundling and increasing the role of private sector in the energy sector. ADB funded projects and programs have had considerable success in supporting the objective of improving the enabling environment for the private sector. ADB supported sectoral reforms in many countries helped with public sector lending and technical assistance that helped to improve energy sector governance and the enabling environment for private sector investment. ADB’s private sector operations have been material, both in terms of catalyzing funding and reducing concerns of both project sponsors and financiers about project risks. ADB’s private sector projects also had positive and sustainable effects on business practices, including, for example: (i) introducing world best practice operations, (ii) exemplary safety records, and (iii) good community relations.

The 2000 Review stated that ADB intended to address environmental issues by promoting energy efficiency, renewable energy, and the use of the clean development mechanism. The evaluation found evidence that some well designed projects improved the environment through energy efficiency and the use of cleaner technologies. However, the level of ADB supported investment in energy efficiency was far below both the potential and the need, and lending for renewable energy accounted for only about 3% of the portfolio. Because low energy prices prevailed during the early part of the evaluation period and the weaknesses in the enabling policy, legal and regulatory environment, the necessary incentives were lacking for utilities, companies, households or governments to invest in these areas. A similar conclusion applies to ADB efforts to reduce greenhouse gas emissions from the energy sector. ADB assistance in these areas for most of the evaluation period was mainly focused on capacity development. ADB’s official statistics understate its contribution to improving energy efficiency. The evaluation found evidence that policy dialogue, particularly related to adopting time of use tariffs and advanced metering and billing technologies, and strengthening transmission and distribution systems can have a positive impact on improving energy efficiency and reducing system losses. Overall this element of the 2000 Review is rated “highly relevant” but the implementation is rated “partly effective”, given the low volume of lending in related areas. New funds developed as part of the Clean Energy and Environment Program position ADB to play a more active role in these areas. If the Clean Energy and Environment Program is successful, it is likely that future evaluations would upgrade this rating.

Regional cooperation has been a continuing objective of ADB in the power sector but results have been slow to materialize, other than in the Greater Mekong Subregion. The initial expectations appear overambitious. In some cases, ADB has been effective in ensuring equitable negotiating positions that allowed countries to come to agreements and has provided a venue to involve other donors. For example, ADB has facilitated energy trade between Lao PDR and Thailand, and Viet Nam and Cambodia. ADB has also made some progress in creating a better regional understanding of the potential benefits of energy trade. Institutional development has been complemented by lending to support regional power projects in the Greater Mekong Subregion. Progress in regional cooperation in the energy sector in Central Asia and South Asia has not been material. Overall, ADB’s efforts to promote regional cooperation in electricity are rated “relevant” and “partly effective”.

The 2000 Review is rated as “effective”. ADB's operations in the energy sector are generally effective. Of the 142 energy projects that have been rated, 82% were rated as

satisfactory or better. This was one of the best results across all sectors in which ADB operates. The success rate for program loans for energy sector development and reforms was lower at 70%. This reflects the difficulty of planning and implementing sector reforms, a lesson that is common throughout the Asia Pacific Region. Of the four pillars, the policy has successfully influenced sector reform and private sector participation in energy sector. Both ADB's public and private sector lending operations benefited from this. While there was evidence of being 'effective' in regional cooperation in energy sector in GMS, ADB has not yet been effective in doing so in other subregions. In other pillars — poverty reduction, and regional and environmental impacts — while the policy was relevant, but its performance was rated as 'partly effective' due to limited results. The evaluation noted that while ADB has recently introduced new initiatives for energy efficiency, renewable energy and the environment, it was too early to assess their outcomes.

Efficiency in achieving the objectives of the 2000 Review was assessed in terms of resource use, input efficiency, and processes including timeliness of outcomes. Energy projects and programs overall have a high success rate in delivering expected outcomes through efficient use of resources. Overall, the 2000 Review is rated "efficient".

The 2000 Review is rated "highly sustainable" in the medium term due to the strong future pipeline of energy projects (i.e., demand from ADB's clients), the value added in terms of demonstration and replicability, and ADB's commitment to the sector as indicated in its second medium term strategy.

Key Lessons Identified

ADB and other development partners have been in continuous dialogue over long periods with many countries about reform of the power sector. Developments after 2000 provide evidence that the dialogue has contributed to improvements in sector policy and desirable reforms. Technical assistance has contributed to sector reform and performance improvement. Private sector principles and practices and independent regulation are providing tangible impacts but efficiency gains can lead to further improvements.

Policy based programs designed to support sector restructuring used tranche releases to try to ensure that agreed policy measures and loan covenants were met. Although there were often delays with compliance, this mechanism has proven to be useful to facilitate the implementation of necessary, but difficult, reforms. The following lessons were common to the program loans designed to support sector restructuring: (i) sector restructuring is a difficult, slow process and the timetables for reform set out in loan covenants and program documents are often too optimistic; (ii) continuity of involvement is essential if ADB is to contribute to the success of reform efforts; (iii) introducing independent regulation at an early stage is a key part of the restructuring process; and (iv) the distribution sector raises the most difficult issues on restructuring and privatization.

ADB's experience has shown that full privatization of public utilities is not necessarily the only option. Corporatization with government ownership can also deliver good results if commercially and financially sustainable principles are introduced to improve efficiency and the delivery of better services to customers. ADB assistance has increased the level of governance across the energy sector resulting in more efficient management, better use of financial resources and reduced opportunity for corruption. Reducing the opportunities for corruption in the sector by addressing two of its main causes, electricity shortages and a lack of good governance, should be a continuing major initiative.

Funding and encouraging independent regulation has been a key success factor in promoting commercial practices in the region. However, progress towards establishing regulators that are fully independent from political intervention has been slow in some countries. Given the region's historical experience with regulated monopolies, regulation in a competitive market is a relatively new activity. Regulators are learning from one another and from international experience. ADB policy dialogue with power sector regulators has been a powerful tool in sharing and promoting best practice.

The evaluation observed a generally good match between program, project and technical assistance designs and the capabilities of executing agencies. ADB has supported well thought out projects, which have been generally delivered within budget. Project designs have benefited from incorporating the evaluation findings from earlier years. The successful outcomes of energy projects reflect the following (i) benefits were immediate once the projects were completed, due to existing demand; (ii) increased electricity supply facilitated economic growth and contributed to a better quality of life; (iii) financial policy dialogue and tariff reforms helped to mobilize more funding for investment, operation, and maintenance; and (iv) executing agencies generally had strong project management teams that had learned lessons from previous projects. There has been a general lack of compliance with financial covenants in the power sector. This suggests that ADB needs to improve the quality of its financial analysis for the power projects. Delays observed in the implementation of more recent projects were less than the delays associated with earlier projects. This can be attributed to the better design of projects, the results of policy dialogue, the growing capacity of executing agencies, and the increased positive work of resident mission staff.

The relationship between economic development and the demand for energy is well established in the literature and by ADB's operational experience. Given that the Asia Pacific Region is the most dynamic economic region in the world, the demand for energy can be expected to continue growing rapidly in the future. The major strategic challenge is how to meet this growing demand for electricity in the most cost effective and environmentally sustainable way. Recent major reports have highlighted the importance of addressing environmental issues related to the energy sector. Nongovernmental organizations have also raised awareness about the importance of addressing environmental issues at both the sector and project level.

The mix of potential energy investments spans the range from new construction, to improved efficiency in new and existing operations, to better management of demand and conservation. The growing demand for power can be met either by building new infrastructure capacity, or by promoting greater efficiency in the distribution and use of electricity. From an engineering and project planning perspective, building capacity is simpler. However, correcting inefficiencies offers the potential for large financial returns and improved environmental outcomes. Improving energy efficiency by examining both demand side and supply side alternatives should be made the single highest priority in the updated energy strategy. Before investing in new energy generation capacity, all feasible efforts should be made to decrease the demand through energy efficiency initiatives and increases in system efficiencies. There are three positive outcomes from using less energy (i) capital costs are reduced since energy efficiency efforts generally half the cost of adding additional capacity; (ii) greenhouse gas emissions and other sources of air pollution are reduced; and (iii) energy security is enhanced. While there are many opportunities to improve energy efficiency, the increasing demand for power in the Asia Pacific region will require significant investment in new generation capacity. Thus, while energy efficiency initiatives should precede funding for new capacity, this should not be at the expense of "turning off the lights". Energy efficiency programs, the development of

renewable energy, the adoption of clean energy technologies are in their infancy in the Asia Pacific region. They have substantial need and potential to grow.

The recent initiatives included in the Clean Energy and Environment Program provide ADB with a broader set of instruments and financing modalities to address energy efficiency, renewable energy and greenhouse gas emissions. This should allow ADB to better help address the energy environment nexus in the future. However, to effectively do so, the lessons of the evaluation suggest that these initiatives need to be complemented by more activities in the following three areas.

First, it may be that ADB's greatest contribution to addressing the environment issues in the energy sector is in the area of policy dialogue. This could include building the enabling policy, legal and regulatory frameworks to promote energy efficiency, renewable energy and cleaner technologies, promoting the use of market based instruments to encourage commercial investments in this area, promoting time of use tariffs and bringing down barriers and designing suitable instruments so that domestic banks can fund such projects in industry, buildings and other commercial establishments as well as in the energy sector.

Second, ADB should, as a matter of routine, reflect environmental costs and benefits in the economic analysis undertaken for energy projects. As a result, ADB would be better able to choose which strategies and projects to support to achieve better environmental outcomes in the energy sector.

Third, ADB should raise environmental assessments beyond the project level to the sectoral level. Such assessments, if properly done, would be an appropriate vehicle to help develop more effective strategies to address issues related to the energy/environment nexus. ADB's attention on environmental issues in the energy sector, focusing on project level safeguards is too narrow. Project-level environmental assessments, however well done, do not adequately handle strategic issues. The project level approach must be complemented by a broader, sectoral level approach to effectively address the strategic elements of the energy/environment nexus. Broader questions include things like (i) Are the right kinds of projects being selected for ADB support? (ii) Are policy reforms preferable to investments in more energy infrastructure? (iii) Could energy efficiency initiatives reduce or eliminate the need for further investment in generation capacity? (iv) What needs to be done to promote renewable energy? (iv) Would regional cooperation in the energy sector be a way to reduce environmental costs?

Recommendations

The results of the evaluation suggest that ADB's support for the energy sector should be driven by two key policy considerations (i) energy efficiency; and (ii) good governance. The objective should be to achieve a future in which an increasing portion of the Asia Pacific region's growing need for energy is met by improvements in energy efficiency and energy technologies that minimize adverse impacts on the environment, and by applying governance measures which lead to commercial- and financially-sustainable management principles.

While the principles and objectives of the 2000 Review remain valid and relevant, there is a need to update and fine-tune the ADB's energy strategy to better reflect current context and development challenges and improve implementation effectiveness. There is also need to incorporate the various initiatives and strategies in the Clean Energy and Environment Initiative. The updated energy strategy should be designed to achieve the following outcomes: (i) improve

efficiencies across the energy chain to minimize investment in new generating capacity to meet the growing demand for energy; (ii) reflect environmental externalities in decision making in the energy sector; (iii) pricing and resource allocation decisions take place under market forces under an effective and credible regulatory oversight; (iv) energy subsidies are transparent and targeted; (v) policies rely on market based incentives to promote efficiency and environmentally friendly behavior; (vi) sector governance is improved to increase efficiency, create opportunities for private sector participation and reduce opportunities for corruption, and (vii) ADB becomes a more client focused institution.

Future operations in the energy sector should be driven by key policy considerations related to energy efficiency and addressing the energy/environment nexus; good governance; and results-based monitoring. This emphasis will require a holistic approach to the efficient development of the energy sector.

Based on the findings of the evaluation, the following areas of the energy policy are recommended for continuation with stronger client focus and more operational vigor: (i) private sector participation including unbundling, restructuring and privatization with improved corporate governance; (ii) mitigation of environmental impacts through promoting cleaner technologies; and (iii) regional economic cooperation in energy sector, considering also cross-border environmental implications. A number of suggestions are presented in Chapter V of the report and Appendix 14.

In addition, the evaluation puts forward the following key recommendations for consideration by Management and also for incorporation in the ongoing review of the energy policy and strategy formulation by the Regional and Sustainable Development Department.

Key Recommendations	Responsibility	Timing
1. Manage the Energy/Environment Nexus: (i) Make improving energy efficiency the single highest priority in the ADB's new energy strategy so that all feasible efforts are made to decrease demand through viable energy efficiency initiatives and increases in system efficiencies before investing in new energy generation capacity. (ii) Complement these initiatives with (a) ADB becoming known as a center for excellence to improve the policy, legal and regulatory framework and the use of market based incentives to improve the enabling framework for energy efficiency, renewable energy and ways to address environmental concerns in the energy sector; (b) incorporating, as a matter of routine, environmental costs and benefits in the economic analysis undertaken for energy projects; and (c) undertaking strategic environmental assessments for the energy sector in those countries in which the country partnership strategy envisions a significant role for ADB in the energy sector.	RSDD and RDs	2007 and ongoing

2. **Improve Sector Governance:** Supplement ongoing efforts to improve governance by providing staff with more guidance on how to address governance issues to reduce opportunities for corruption in the energy sector.	OAG, RDs, and RSDD	2008 and ongoing
3. **Develop an Implementation Plan for the new energy strategy that:** (i) reconciles the policy and strategic aspirations with organizational, budget, and human resources implications; and (ii) includes a results framework with monitorable key indicators (for inputs, outputs and short and long term outcomes/results) so that implementation progress can be monitored and, if necessary, midterm corrections can be made.	RDs, RSDD, SPD, and BPMSD	2008 and ongoing

ADB = Asian Development Bank, BPMSD = Budget Personnel Management System Department, OAG = Office of the Auditor General, RDs = Regional Departments, RSDD = Regional and Sustainable Development Department, SPD = Strategy and Policy Department.
Source: Special Evaluation Study.

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I. INTRODUCTION

A. Background and Rationale

1. The Asian Development Bank (ADB)'s *Policy Initiatives for the Energy Sector (*1995 Energy Policy)[1] emphasized sector reforms to unbundle regulated monopolies and develop independently regulated and privatized energy markets. This was expected to lead to more efficient use of energy, lower costs, and more private investment. Within the framework of the 1995 Energy Policy, the *Energy 2000: Review of the Energy Policy of the Asian Development Bank* (2000 Review) emphasized four operational priorities: (i) reducing poverty; (ii) promoting private sector involvement; (iii) addressing environmental impacts; and (iv) promoting regional cooperation.

2. The intent was for ADB to help create an appropriate policy and institutional environment and capacity support to develop and extend the availability of energy resources. The 2000 Review supports a wide range of development initiatives such as poverty reduction, inclusive social development, removal of subsidies, better governance, use of information technology, better environmental protection, efficiency improvements, energy conservation, more co-financing, and more capacity building.

3. The 2000 Review calls for a review of the policy within 5 years. The Regional and Sustainable Development Department RSDD requested an independent evaluation by the Operations Evaluation Department (OED) to assess the relevance and effectiveness of the 2000 Review to provide an input for a 2007 review of the energy policy and the formulation of the energy strategy.

B. Evaluation Objective and Focus

4. The evaluation focused on:

(i) Examining the specific features of the 2000 Review, including their intent as directives, safeguards, and development approaches;
(ii) Assessing the adequacy of coverage and relevance of the 2000 Review to ADB operations, taking into account subsequent global and regional developments and subsequent ADB initiatives in the energy sector;
(iii) Examining the extent to which guidance provided in the 2000 Review has been taken into account in project designs;
(iv) Examining the performance of ADB energy sector assistance before and after the 2000 Review, and identifying trends which may be attributed to the 2000 Review;
(v) Identifying areas in the energy sector where ADB made a contribution to poverty reduction; and,
(vi) Identifying lessons and identifying issues to be considered in the formulation of the energy strategy.

C. Evaluation Framework, Methodology and Data

5. The evaluation framework includes a review of both the external and internal context. The external context includes an array of international and regional commitments, conventions,

[1] ADB. 1995. *The Bank's Policy Initiatives for the Energy Sector*. Manila.

agreements and regulations, institutional priorities, capacity-building requirements, and strategic investments over time. International and regional agreements affect both ADB and country policies, strategies, programs, and projects. Other external factors include the global importance of energy, growing concern about greenhouse gas emissions and global warming, trends in fuel cost, technology innovations and applications, and energy management practices. These contemporary issues and challenges need to be considered in a review of ADB's energy policies and operational strategies.

6. The key contextual areas taken into account by the study were (i) collaborative and partnering initiatives of ADB with other international organizations and networks in mobilizing resources and sharing expertise; (ii) the internal policy context, which includes ADB's overarching goal of poverty reduction, the 2000 Review's intent; and (iii) the objectives of an array of ADB policies, which have an influence on the performance of the energy sector and ADB's operations in the energy sector.

7. Key data and information sources included interviews and discussions with selected ADB staff, Developing Member Countries (DMC) officials, investors and operators in the public and private sectors, published reports of ADB, other multilateral banks and governments, and ADB's operational data and management information system. The study supplemented the information previous evaluations undertaken by OED, particularly power sector assistance program evaluations in Bangladesh,[2] Pakistan and the Philippines,[3] and energy sector project performance evaluation reports, with field visits in India, the Peoples Republic of China (PRC), and Sri Lanka.

II. THE ENERGY POLICY CONTEXT

A. 1995 and 2000 Energy Policies

8. When ADB prepared its first Energy Policy paper[4] in March 1981, after the second oil crisis of 1979 the world faced record-high crude prices and concerns about the security of supply. ADB's policy stressed overcoming the crisis caused by oil price shocks. Its assistance focused on energy infrastructure development, with emphasis on developing of indigenous energy, promoting energy efficiency and building incentives to encourage foreign investments in the energy sector.

9. In 1995, ADB released its second Energy Policy paper.[5] The paper noted that power sectors in the Asia Pacific region were growing but were inefficiently managed. This reflected the dual role of governments as both monopoly owners and policy makers. The 1995 Energy Policy identified three major sectoral issues (i) defining an appropriate role for the government in the sector; (ii) enhancing the efficiency of production, transportation, and end use of energy; and (iii) more closely integrating environmental considerations in all energy sector activities. It advocated recovering full costs from users, avoiding subsidies and cross-subsidies, and establishing independent regulators to adjust electricity tariffs based on transparent tariff principles. The paper advocated corporatizing and commercializing government-owned utilities as a prelude to privatization. The paper also emphasized the development of energy infrastructure and indigenous energy sources to promote efficiency and create incentives to attract foreign investment. It outlined the operational implications of policy choices to align

[2] ADB. 2003. *Sector Assistance Program Evaluation of the Bangladesh Power Sector.* Manila.
[3] ADB. 2006. *Sector Assistance Program Evaluation of the Philippines Power Sector.* Manila.
[4] ADB. 1981. Working Paper No. 2–81. *Role of the Bank in the Energy Sector in the Region*. Manila.
[5] ADB. 1995. *The Bank's Policy Initiatives for the Energy Sector.* Manila.

selection and pursuit of energy sector activities in each DMC with ADB's corporate strategy, country strategy, and sector policies.

10. Issues identified in the 1995 Energy Policy included (i) structural reform; (ii) energy efficiency; (iii) energy pricing; (iv) energy and environment; (v) rural energy development; and (vi) regional cooperation and energy development. The 1995 Energy Policy centered on (i) enabling private investments in the energy sector; (ii) demand-side management (DSM); (iii) integrated resource planning; (iv) energy efficiency; and (v) local and national environmental considerations. Its recommendations covered power (electricity), hydrocarbons (coal, oil, and gas), and rural energy systems (including renewable energy sources).

11. Common themes that cut across all ADB assistance in the energy sector involved (i) preferential allocation of ADB's resources to the countries willing to restructure their energy sector to improve efficiency and to attract private investments to meet incremental demand; (ii) support for private investment through build-own-operate/build-own-operate-transfer projects, as well as joint-ventures between government utilities and private investors; (iii) emphasis on both supply-side and demand-side energy efficiency improvements before providing assistance for generation capacity addition; (iv) emphasis on environmental protection at all stages of the project cycle; (v) support for the development and utilization of natural gas resources; (vi) promotion of regional trade in energy; and (vii) promotion of rural energy supply and renewable energy development, based on decentralized systems, internalization of environmental costs and benefits, adoption of life-cycle costs for comparisons, private initiatives and institutional sustainability.

12. The 2000 Review reoriented policy goals of energy sector operations to focus on: (i) poverty reduction, (ii) private sector participation and sector restructuring, (iii) regional and global environmental impacts, and (iv) regional cooperation. The new operational priorities were:

(i) Reducing poverty by creating energy infrastructure for sustainable growth, increasing access to energy for the poor, particularly in rural areas, and making sure that the poor account for a major portion of project beneficiaries;[6]

(ii) Promoting private sector involvement[7] by restructuring the energy sector to address (a) public sector monopolies; (b) hydrocarbon and power restructuring through unbundling, promoting competition, formulating energy policies, enacting of laws, implementing environment and social safeguards and promoting efficiency improvements taking account of the stage of economic development and constraints of each DMC; (c) supporting energy pricing policies, tariff reforms and energy management; and (d) promoting good governance in the energy sector.

(iii) Addressing regional and global environmental impacts by supporting measures which address acid rain problems, use clean energy, Kyoto Protocol mechanisms for greenhouse gas abatement, and financing renewable energy projects; and

(iv) Promoting regional cooperation by helping identify and implement export-oriented hydropower and natural gas-based generation and transmission projects.

[6] The emphasis on poverty reflected ADB's adoption of poverty reduction as its overarching goal in 1999.

[7] ADB formulated a comprehensive private sector development strategy in 2000 aimed at strengthening the role of the private sector as the engine of growth in the Asia Pacific region.

B. The Global Context of Energy: Current Scenario and Challenges

13. Since the 2000 Review, there have been a number of major global and regional developments in the energy sector. Fuel costs have increased significantly. Concerns have further increased about environmental issues e.g., global warming, acid rain, the social and economic costs of pollution, and fuel security. Implementation of energy market reforms have proven to be more difficult and slower than expected.

14. Fuel prices have increased sharply, since 2000 driven partly by the rapidly growing energy needs in the Asia Pacific Region and by concerns about geo-political peace and stability in the Middle East. Oil prices more than doubled from $28 per barrel in 2000 to $66 per barrel in 2006. Coal prices rose sharply in 2004, but have since declined (Table 1). Coal prices are expected to fall below $40 per ton, while oil prices are expected to remain above $50 per barrel for some time (Table 2). Other factors contributing to higher prices include refinery bottlenecks, shipping shortages and the growing importance of hedge funds and other speculative investors in commodities markets, especially oil futures. The energy-importing countries in Asia are hit hardest as increasing proportion of their scarce foreign exchange resources need to be used to finance oil imports.

Table 1: Average Annual Prices of Coal and Oil

Year	Coal Price $/ton	Oil Price $/barrel
1999	25.89	18.07
2000	26.25	28.23
2004	54.70	37.73
2005	52.00	49.00
2006	52.00	66.17

Sources: Platts, World Bank, XTRADA (2005, 2006).

Table 2: Forecast Energy Prices
Constant 2005 Prices

	2007	2008	2010
Coal, Australia, ($/mt)	40	35	30
Crude oil, average, ($/bbl)	54	50	43
Natural gas, Europe, ($/mmbtu)	7	6	5
Natural gas, ($/mmbtu)	7	7	6

bbl = barrel, mmbtu = million British thermal unit, mt = metric ton.
Source: World Bank 2005 *Commodity Forecasts*, Washington DC.

15. The Asia Pacific region, the most dynamic economic region in the world, is consuming a growing share of the world's total primary energy supply. The Asia-Pacific region's share of the world's energy supply grew from 13% in 1973 to 25% in 2003. Although energy use on a per capita basis is low, it will increase as incomes and standards of living improve (see Figure 1). With economic growth in the region expected to remain above 5%, the demand for electricity will continue to grow rapidly. By 2030, regional energy use is expected to increase by 89% and

account for 30% of total world consumption.[8] The challenge is how to meet this growing demand for energy in the most cost effective and environmentally sustainable manner.

Figure 1: Electricity Consumption and Gross Domestic Product

Kilowatt Hours of Electricity Per Capita vs. GDP Per Capita (Purchase Price Parity in 2000)

GDP = gross domestic product, kWH = kilowatt hour
Source: International Energy Agency. 2005. *World Energy Outlook 2005.*

16. The Asia Pacific region is largely dependent on fossil fuels, with coal, oil, and natural gas accounting for 41%, 25%, and 7%, respectively, of the energy used. Coal is the dominant fuel in two of the largest economies in the Asia Pacific Region, the People's Republic of China (PRC) and India. The reliance on fossil fuels, coupled with the increase in energy use, has led to a corresponding growth in the Asia Pacific region's share of greenhouse gas emissions. In 1973, the Asia Pacific region accounted for only 8.7% of global greenhouse gas emissions. By 2003 its contribution had increased to 24% and is projected to reach 30% by 2030 (footnote 8). Globally there has been an increased concern supported by a growing body of scientific evidence about the nexus between the energy sector and the environment. There are growing concerns about greenhouse gas emissions and their effects on global warming, and climate change. This has promoted a greater emphasis on the clean development mechanism (CDM), emissions trading and energy efficiency. Emission trading has commenced world wide, but its possible value and use in Asia is largely undeveloped.

17. The effects of increased greenhouse gas emissions are believed to be the primary cause of climate change. The Stern Review[9] indicates that the impacts of climate change and subsequent global warming are not evenly distributed; the poorest countries and people will suffer earliest and most. Developing regions are at a geographic disadvantage: they are already warmer, on average, than the more developed regions, and they also suffer from high rainfall variability. As a result, further warming will bring poor countries high costs and few benefits. Developing countries, in particular the poorest, are heavily dependent on agriculture, the most

[8] International Energy Agency (IEA). 2005. Key Indicators. *World Energy Outlook 2005.*
[9] 2006. *Stern Review: The Economic of Climate Change*. Cambridge, U.K.

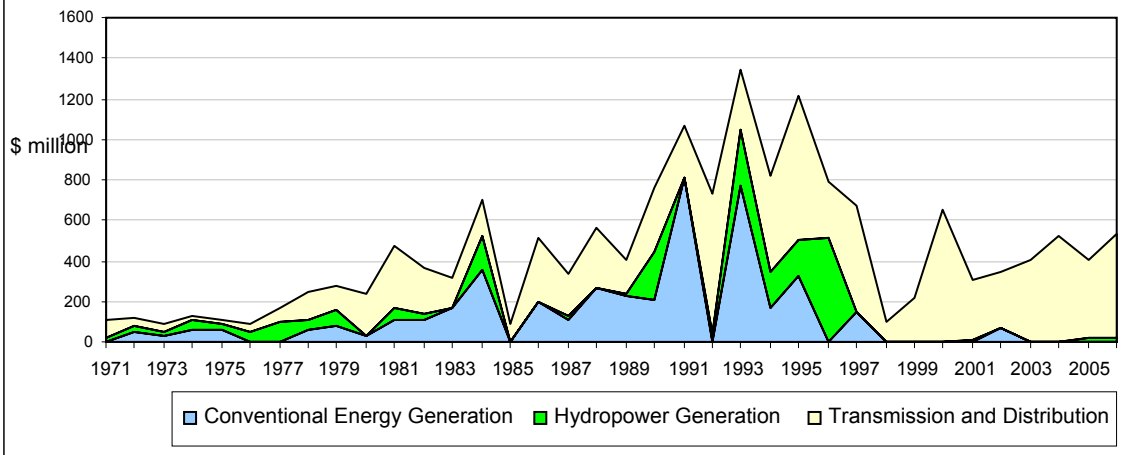
climate-sensitive of all economic sectors. Low incomes and vulnerabilities in DMCs make adaptation to climate change particularly difficult. Climate change is likely to reduce the already low incomes and increase illness and death rates in developing countries. Falling farm incomes will increase poverty and reduce the ability of households to invest in a better future. At a national level, climate change will cut revenues and raise spending needs, worsening public finances.

III. ENERGY SECTOR OPERATIONS

A. Lending and Non-lending Operations

18. ADB's public sector lending in the energy sector over 1996-2006 amounted to $8.754 billion in 21 DMCs (Appendix 1, Table A1.1). Private sector investment assistance (equity and loans) in the energy sector in 10 DMCs totaled $1.216 billion. Lending for energy infrastructure peaked in 1993 and declined significantly for several years (Figure 2). ADB also provided 148 advisory technical assistance (TA) projects, totaling $81.9 million approved from January 1996 to December 2006. Most of the TA projects were to support energy sector development, subregional power interconnection and regional power trading, energy and environment related issues, and energy efficiency. In addition, 24 regional TA amounting to $22.1 million during the same period financed various studies, research, capacity building workshops and seminars, and subregional cooperation meetings.

Figure 2: Public Sector Power Infrastructure Lending



Source: Asian Development Bank database.

19. There have been shifts in geographical distribution of ADB's energy sector projects. Several past recipients of large energy infrastructure loans and energy sector programs (e.g., Indonesia, Malaysia, the PRC, and Thailand) have developed their energy sectors and capital markets to such an extent that most energy infrastructure is now funded locally rather than with ADB support. Although the locally developed capital markets do not offer the tenure available from ADB loans and offer similar rates, the conditionalities associated with ADB lending and the reduced foreign exchange risks make these more attractive to local investors. ADB's energy sector lending to Bangladesh, Cambodia, India, Sri Lanka, and Viet Nam increased in 2001—2006, accounting for over 57% of public sector loans. (See Appendix 1 for more details).

Overall, DMCs with poor infrastructure and low technical capabilities still require significant assistance for energy infrastructure, sector development, and capacity building.

20. Table 3 summarizes ADB's energy sector portfolio. Total lending to the energy sector has grown only modestly since the 2000 Review; and average annual lending in the two periods increased by 11%. During both periods, 78% of ADB lending went to transmission and distribution projects and sector reform programs. The share of thermal generation in the portfolio rose from 7% to 15% because of increased private sector lending. From 1969 to 2006, ADB financed 22 coal-fired generation plants for $2.83 billion. Since 1996, however, ADB has funded only three coal-fired plants in the private sector and none in the public sector. However, five coal-fired plants are in the 2007/8 pipeline totaling $1.79 billion. The other thermal plants were gas or oil-fired. ADB support for hydropower projects declined sharply after the 2000 Review, particularly in public sector lending. Renewable energy remains a small part of ADB's energy portfolio. ADB's private sector lending rose to 18% of total energy lending after the 2000 Review up from 5% in the 1996 to 2000 period.

Table 3: ADB's Energy Sector Operations 1996 to 2006

	1996-2000	2001-2006	1996-2000 Proportion of Lending	2001-2006 Proportion of Lending	Change Annual In Average Lending
	$ million	$ million	%	%	%
Public Sector					
Sector Development	1,496	2,134	37	46	19
Transmission and Distribution	1,768	2,178	43	47	3
Thermal Generation	152	148	4	3	(19)
Hydro Generation	512	48	12	1	(92)
Renewable Energy	158	161	4	3	(15)
Subtotal	4,086	4,669	100	100	(5)
Private Sector					
Transmission and Distribution	0	215	0	21	–
Thermal Generation	163	715	82	70	266
Hydro Generation	37	87	19	9	96
Subtotal	200	1,017	100	100	324
All Sectors					
Sector Development	1,496	2,134	35	38	19
Transmission & Distribution	1,768	2,393	41	42	13
Thermal Generation	315	863	7	15	228
Hydro Generation	549	135	13	2	(80)
Renewable Energy	158	161	4	3	(15)
Total All Sectors	4,286	5,686	100	100	11

Source: Asian Development Bank database.

21. The following sections discuss ADB lending and non-lending operations undertaken under the operational priorities of the 2000 Review.

B. Poverty Reduction and the Energy Sector

22. The 2000 Review envisages multiple links between poverty reduction and energy services, particularly electric power. Electric power – a major energy service – contributes to income and non-income poverty reduction through various channels. At the national level, it serves as an input to industry, transport and communications, and cross-border power trading. At local levels, it facilitates economic development by supporting agriculture and through non-farm economic activities. At community level, electricity improves health and education services, and at the household level it provides basic lighting which facilitates cooking, reading, household level economic activities, among others. Electricity can also reduce or avoid household level pollution due to the use of coal, wood fuels, etc., and improving public health outcomes, particularly of women, children and elderly people. Lack of alternative energy sources can lead to public health problems and hence, energy poverty is linked with the millennium development goals.

23. There is evaluation evidence which demonstrates that access to electricity improves the lives of the poor. A socioeconomic survey to assess the impact of ADB funded electrification on rural (and some urban) users in villages across Luzon, Visayas, and Mindanao (footnote 3) reported that electricity contributes to (i) income generation, (ii) information dissemination, (iii) reduced birth rates, (iv) longer study times for children, (v) access to entertainment, and (vi) improved quality of life in general. A survey of electricity customers undertaken for the Bangladesh Power SAPE (footnote 2) found that that the availability of electricity was positively correlated with a wide range of economic and social indicators, including higher participation rates by women in income generation, better nutrition, higher wages for the landless, and more studying and working time during evenings. However, the survey did not find statistically significant evidence that rural households with electricity had higher incomes than those without electricity, as suggested by an earlier survey. This may reflect other factors at work in the different geographic areas covered (e.g., activities of non-government organizations, distance to a national road or urban area, population mobility).

24. Affordability is a major issue for poor consumers; hence cost efficiency is a major concern. There are a number of good practices implemented through ADB loans and TA which have helped to achieve this. These include (i) following least cost strategies for generation and transmission and distribution upgrades; (ii) ensuring a good balance between generation, transmission and distribution capacity; and (iii) ensuring that technical and non technical losses of power (in particular theft) are minimized. These issues are largely being addressed through sector restructuring and the introduction of better sector governance and commercial management principles. In addition, ADB has encouraged the use of subsidized lifeline tariffs for the poor (e.g., Bhutan, the PRC, Nepal, and the Philippines), discouraged indiscriminate subsidies (India), supported least cost generation through international competitive bidding (ICB) (e.g., Bangladesh and Sri Lanka), promoted balanced sector development and helped reduce technical and non technical losses in all DMCs.[10] This is particularly reflected in lending programs in India and the associated covenants, policy dialogue, cooperation with other development partners and TA.

[10] Examples include the sector restructuring in India, where production costs have been significantly reduced and availability of supply has been increased. For detailed discussion see the ADB. 2007. *India Power Sector Assistance Program Evaluation (forthcoming)* and discussion in the following section.

25. Some countries have achieved greater success than others at increasing electrification ratios. For example, Sri Lanka has done well and electrification levels surpass its near neighbors. The electrification rate in the PRC has reached 99%. There are lessons for other countries in the way in which Sri Lanka and the PRC have approached electrification. For example, loans are made available to enable poor households to pay for the initial connection to the grid. The schemes worked well with high levels of up take and subsequent repayment. Covenants in some ADB loans also explicitly targeted increasing number of connections. In Bangladesh, there have also been successful initiatives that have promoted power distribution in rural areas through the Rural Electrification Board and the network of rural power cooperatives which were developed with its support. These cooperatives have better management records than those in other countries (e.g., the Philippines) and their example may have potential for application elsewhere in the region. A major concern regarding rural electrification projects is that there is a danger of making poor people poorer. This may occur when the rural population pays for the connection charges and the related internal wiring of their respective houses, usually on a monthly basis, and invest in household appliances that run on electricity. However, they still have to buy the kerosene, batteries, and wood fuels for cooking as the electricity is not provided when it is required particularly during the evening peak periods. There is a need to ensure that there are sufficient supplies to meet the projected increased demand.

26. A desk review of 44 energy sector loans approved between 2001 and 2006 revealed that only 9 of them had poverty intervention components. Of them, 2 were for rural electrification (Lao PDR and Bhutan) and the rest had elements to connect approximately 577,000 rural householders to the grid. Other expected indirect benefits accruing to poor people were long term employment opportunities for local residents (3 loans) and the employment of local persons during the construction phases. Another 2 million poor persons directly benefited from two loans which lowered district heating tariffs as a result of the replacement of older inefficient equipment with modern equipment. In addition, the field study of this evaluation found further evidence that ADB helped to bring electricity to the rural poor (i) in the PRC (65,000 persons were connected as part of a project in Yunnan Province); (ii) in Gujarat State, India, villages were being connected with 24 hour access to power through a redistribution of power from agricultural connections to off peak periods;[11] and (iii) 78,000 new rural consumers in Assam State in India were connected. These efforts made many projects more pro-poor by adding components that would benefit the poor directly, but these add-ons complicated project designs and made project management and implementation more difficult.

27. There are still significant numbers of persons without access to power in the Asia Pacific region and the electrification ratio varies from country to country (see Table 4). It ranges from below 7 to 100. The provision of electricity is recognized as making a necessary contribution to poverty reduction. The large numbers of persons without power suggests that significant funding will be required in some countries in the future to achieve higher levels of access. The 2000 Review emphasized increasing access to energy for the poor, particularly in rural areas, and ensuring the poor accounted for a major portion of project beneficiaries. Given this emphasis on poverty, one would expect operations in the energy sector to be concentrated in those countries with low electrification ratios and/or the number of projects focused on rural electrification to increase significantly. The data indicate that neither happened (see Table 4). While about two-thirds of the public sector lending went to countries like Bangladesh, India, Indonesia and Pakistan during 2001—2006, the projects were not necessarily targeted at poor rural

[11] Subsequently the quality of power to both sectors improved.

households. This finding indicates that factors other than poverty were used to position ADB's operations in the energy sector and to guide the selection of projects for ADB support.[12] This finding is not surprising as factors other than providing rural electrification drive strategic decision making in the energy sector in all countries.

Table 4: Electricity Access of DMCs in 2005

Country	Electrification Ratio	Population without Electricity	Population with Electricity	ADB's Public Sector Energy Loans (2002-2006)	
		(millions)	(millions)	($ millions)	% of Total lending to DMC
Afghanistan	7.0	27.0	2.0	61.5	2.8
Bangladesh	32.0	96.2	45.3	484.9	22.3
Bhutan	–	–	–	9.4	0.4
Brunei	99.2	–	0.4	–	–
Cambodia	20.1	10.9	2.7	64.3	3
India	55.5	487.2	607.6	400.0	18.4
Indonesia	54.0	101.2	111.8	215.0	9.9
Lao PDR[a]	30.0	–	–	30.0	1.4
Malaysia	97.8	0.6	24.7	–	–
Mongolia	64.1	1.0	1.8	–	–
Myanmar	11.3	45.1	5.7	–	–
Nepal	33.0	18.1	8.9	–	–
Pakistan	54.0	71.1	83.5	236.0	10.8
Philippines	80.5	16.2	66.8	40.0	1.8
PRC	99.4	8.5	1302.1	135.0	6.2
Singapore	100.0	–	4.3	–	–
Sri Lanka	66.0	6.7	13.0	–	–
Taipei, China	99.2	0.2	22.9	–	–
Thailand	99.0	0.6	64.1	21.5	1.0
Viet Nam	84.2	13.2	70.3	480.0	22.0
				2,177.6	100.0

[a]2003.

ADB = Asian Development Bank, DMC = developing member countries, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Sources: International Energy Agency. 2005, *Energy Outlook 2005,* Asian Development Bank database.

28. The majority of the pro-poor benefits of energy investments are indirect, resulting from the increased economic activity and the resulting job creation and income activities. Access to a reliable supply of electricity is a necessary but not sufficient condition for economic growth to take place. While there were efforts at the project level to give ADB funded projects a sharper poverty focus, the scope of these projects were small relative to the total investments in the energy sectors in DMCs. Research undertaken by ADB and others[13] since the 2000 Review suggests that investments in sectors other than energy would result in greater returns in terms of rural poverty reduction (Table 5). Energy sector investments, while important for economic development, are not the most effective and efficient way to reduce poverty. The relative role of energy in terms of poverty reduction was not carefully analyzed in the 2000 Review. However, the recent change to a geographical focus may provide greater intervention effects. More

[12] Considerations did not include the investments of the concerned governments, private sector and other development partners.

[13] ADB. 2004*. Technical Assistance for Assessing the Impact of Transport and Energy Infrastructure on Poverty Reduction*. Manila. (TA 5947), Thorat, Sukhadeo, and Shenggen Fan. 2007. *Public Investment and Poverty Reduction Lessons from China and India*. Economic and Political Weekly.

recently, ADB has supported geographic targeting of energy assistance to those areas which are relatively disadvantaged, such as Gansu in the PRC, and Madhya Pradesh in India, in order to localize direct and indirect effects in the poorer regions of DMCs.

Table 5: Public Investment and Poverty Reduction

	Ranking of Returns in Poverty Reduction			
	PRC	**India**	**Thailand**	***Viet Nam***
Agriculture Research and Development	2	2	2	*3*
Irrigation	6	7	5	*4*
Education	1	3	4	*1*
Roads	3	1	3	*2*
Telecommunications	5			
Electricity	4	8	1	
Health		6		
Soil and Water Conservation		5		
Anti-poverty programs	*7*	*4*		

PRC = People's Republic of China
Sources: Fan, Zhang and Zhang. 2002; Fan, Hazell and Thorat. 1999; Fan, Jitsuchon and Methakunnavut. 2002; and Hao and Fan. 2001.

29. The above suggests a wider analysis of the role of energy and poverty reduction should underpin the next review of the energy policy. While opportunities should be taken to sharpen the focus of some energy projects on the poor, the revised policy should not provide guidance to require staff to attribute poverty reduction to most operations in the energy sector. This is consistent with the recommendation in the enhanced poverty reduction policy to move away from attributing poverty reduction at the project level and for ADB to focus more on monitoring poverty at the aggregate level.

C. Promoting Private Sector Participation

30. ADB actively promoted private sector participation in the energy sector through (i) private sector operations, providing equity participation, direct financing, co-financing, and loan guarantees for private energy projects; (ii) supporting sector restructuring that typically involves (a) creating an enabling environment for the private sector; (b) creating an independent regulator and separating generation, transmission and distribution functions; and (c) privatizing power companies; and (iii) enhancing standards of governance and management. In many cases these approaches draw on best practice in the private sector, follow similar management principles, and may involve input from private firms.

31. Strategies and techniques have changed in the light of experience gained, demonstrated best international practice and changing circumstances. In the early 1990s, efforts were made to promote independent power producers (IPPs). Many countries in the region adopted the necessary enabling legislation, sometimes with ADB support. This led to a number of IPPs, with varying degrees of operational and financial success. More recently the focus has been on comprehensive sector restructuring leading, eventually, to full or extensive privatization of the sector. This is taking place in some countries, albeit slowly. Good governance, at both the sector and project levels, has become a growing priority for ADB as it has been learned that delays in achieving privatization and high levels of investment in the power sector reflect, in part, problems related to governance.

32. Build Operate and Transfer (BOT) schemes shift responsibility for generation projects to the private sector, while the government and utilities remain responsible for development and operation of the power system as a whole. Project sponsors receive a limited right of ownership over a new facility, or concession, for 20 or 30 years, after which ownership of the project assets reverts to the government or utility. This keeps debt off utility balance sheets, but creates large contingent liabilities which are often not noted in the accounts of governments or utilities and complicates the evaluation of the financial risk of the power purchase agreement (PPA) to offtakers.

33. The first regional IPPs were promoted by international energy groups wishing to expand their operations to Asia, but subsequent events in the aftermath of the Asian financial crisis and the renegotiation of many contracts led to the decline of interest. Too many PPAs were based on overly optimistic forecasts of tariff increases and demand and/or actual undersupply leading to an oversupply of capacity. As a result, many governments were shouldered with contractual obligations for capacity which was not needed. Some IPPs were developed without open, transparent bidding and involved inflated costs and allegations of corruption. The foreign currency needs to service dollar denominated loans related to PPAs placed increasing financial burdens on affected DMCs, especially in the aftermath of the Asian financial crisis. In some cases, a 100% tariff increase was needed to cover the required foreign currency loan repayments.

34. In response to the oversupply in capacity, some countries, including India, Indonesia, Pakistan, Philippines, and the PRC renegotiated PPAs. Renegotiations of PPAs have impacted on the willingness of private investors to invest in new projects as perceived political and country risks are now greater and hence financing costs are higher. Although these negotiations reduced the profitability of the IPPs, the resulting lower tariffs saved consumers millions of dollars on their power bills across the Asia Pacific region. On the other hand, the investment value of the IPPs declined significantly. Regulatory uncertainty has also undermined the promotion of private sector investments. Supreme Court challenges to Energy Regulatory Commission rulings in the Philippines and lack of progress in establishing a well functioning regulatory regime in Bangladesh and other countries continue to dampen investment in the power sector. As a result of the uncertainty of contract enforceability, commercial lending institutions and investors have become more risk-averse. International private sector finance for generation infrastructure has been limited in the last six years and international banks now require an equity contribution in the order of 50%. Previously, IPPs with government guaranteed off-take agreements, were able to finance their plant with equity contributions as low as 20%.

35. In 2003 OED conducted an evaluation of IPPs and PPAs.[14] That evaluation concluded that PPAs should be written to spread risks more fairly between the country and IPP. The main concerns were (i) their relatively long duration; (ii) the fixed prices, designed to create a stable and certain revenue stream for the IPP; (iii) lack of requirement for the IPP to assume any market risk; (iv) contract provisions that are less demanding than detailed market rules which are designed to promote increased efficiency and competition; and (v) failure to design them for transition to a competitive market. PPAs used in the newer projects financed by ADB, including Nam Theun 2[15] in Lao PDR and the private sector generation project in Bangladesh reflect the recommended changes. Proposed ADB assistance for projects in Viet Nam is also designated to ensure greater risk sharing between IPPs and DMC governments.

[14] ADB. 2003. *Cost Recovery in the Power Sector*. Manila.
[15] ADB. 2005. *Nam Theun 2 Hydroelectric Project*. 2005. (Loan 2161).

36. While international interest in IPP investment has diminished, there has been increased interest from local investors. For example in Bangladesh and Viet Nam, which have poorly developed capital markets, local investors are willing to promote IPP projects. The Karachi Electricity Supply Corporation (KESC) was sold to a local investor. In India the 2003 Electricity Act and the creation of PTC India Limited (formerly the Power Trading Corporation) have given significant impetus to IPPs. PTC now acts as an intermediary between the state electricity boards and IPPs holding long term PPAs with both purchasers and sellers and enabling IPPs to securitize the off-take. Power trading is growing and allowing better matching of demand shortfalls with supply surpluses. During 2004/05, 3,949 megawatts (MW) of new IPP capacity was added in India and there has been financial closure on 4,000 MW of new IPP capacity since January 2006. Both ADB's public and private sector operations are participating in IPP projects in many DMCs.

37. The involvement of local investors can help remove some of the foreign exchange risks, although foreign investors within the region can also mitigate this risk by designing their financing packages accordingly. There is also some evidence of a growing interest of some companies in the region to invest in the power sector in other DMCs. The leading Indian thermal generator, National Thermal Power Corporation, is considering investing in Sri Lanka. An Indian private group has been considering a group of investments in Bangladesh, including a coal fired power station. A series of hydropower projects in Lao PDR are designed to sell power to Thailand and the PRC companies are building power plants in Cambodia, Lao PDR, Myanmar and Viet Nam with plans for a plant in Mongolia. This suggests that there is considerable scope expanded ADB involvement in this sector.

1. Private Sector Operations

38. ADB has taken an active and growing role in financing private power generation investments. From 1996 to 2000, the total ADB equity, lending, partial credit guarantees, political risk guarantees and commercial co-financing using the complementary financing scheme in the energy sector totaled $557 million. In the period 2001—2006, this more than tripled to $1,722 million. Most of these projects involved new thermal generation projects (68%). The level of private interest in generation projects and in natural gas distribution and storage enabled ADB to continue support large scale generation and gas transmission projects despite the sharp fall in public sector lending for such projects.

39. OED has evaluated several private sector energy projects in Bangladesh, India, the PRC, and Sri Lanka. All these projects were rated as successful (see Appendix 2). More recent projects under development show a marked increase in due diligence, particularly in generation and fuel transmission relative to earlier projects.[16]

40. The benefits of ADB's involvement in private sector power projects extend beyond its financial contributions. Its involvement has supported progress on reforms, given confidence to other investors, encouraged the adoption of best practice and supported demonstration projects. The investment in the Bangladesh project illustrates best practice (Box 1). In the case of the Indian project, only a small ADB financial participation was required to help make the project viable. This pioneering project demonstrated a replicable model. Similar projects are now being financed without ADB support.

[16] Confidentiality provisions in ADB private sector loans preclude divulging lenders identities.

41. As part of the field study of this evaluation, interviews were conducted with project sponsors' senior executives to gain feedback of ADB's performance. Executives interviewed felt that a major benefit of ADB's involvement was to facilitate interactions between their corporations and the counties in which they were operating, particularly in times of difficulty. This involved staff from both ADB headquarters and the resident missions. ADB was instrumental in helping to settle the tariff dispute between a project and the offtaker in the PRC. In Sri Lanka, ADB helped in (i) negotiating the Sri Lanka Government's counter-guarantee; and (ii) resolving payment issues during an industrial accident at the project plant. One of the major advantages of ADB's involvement is the ability of the public and private sides of ADB to work together to resolve problems. Executives interviewed believed that there is a conflict of interest between ADB debt and equity participation in one project (e.g., if there is a renegotiation of a PPA). One executive expressed regret about the limitations imposed on ADB's participation in any one project and with a single company as the sponsor wanted to increase its ADB borrowing.[17] There was a very high level of satisfaction overall expressed by all executives on the partnership of the sponsor with ADB, and all indicated that ADB's large public sector involvement in the countries where their projects were developed provided intangible additional security. Private Sector Operations Department (PSOD) staff interviewed during the evaluation also noted the high level of professional assistance and country and sector knowledge provided by resident missions in facilitating PSOD projects.

42. Feedback from the interviews indicated that ADB funding has two major benefits compared to other lenders (i) ADB private sector department is perceived to be superior with respect to other multilateral agencies in its approach to contractual arrangements, and (ii) ADB's PSOD has an advantage compared to other lenders as it interacts directly with its counterparts in ADB's public sector operations.

43. Successful outcomes in these projects can be attributed to (i) financially strong sponsors; (ii) equitable sharing of risks by sponsors and offtakers; (iii) the synergy effect between ADB private and public sector operations; (iv) the "intangible" value of ADB participation which provides assurances to other co-financiers; (v) ADB's strong private sector project finance experience and expertise comparable to international banks; and (vi) ADB's willingness to respond to changing client needs.

[17] Asian Development Bank has responded to these concerns and these limits have recently been increased.

Box 1: Generation Project in Bangladesh

The project is an example of best practice for securing a large individual power producer contract. The project was the first major initiative designed to involve the private sector in improving Bangladesh's power sector. Asian Development Bank (ADB) was instrumental in planning and securing private sector participation by providing technical assistance to help the Bangladesh Power Development Board implement the project by developing procedures, guidelines, and documents for bidding among private sector sponsors, as well as evaluating their proposals. A fair and transparent international competitive bidding and evaluation process was carried out, resulting in the successful conclusion of a contract with Company II, a private power developer. The levelized 2.8 cents per kWh (at 2000 prices, with gas priced at $2.4/GJ) tariff reduced Bangladesh's average costs of generation. The reasons for the success of the project are:

(i) Through an open bidding process supported with ADB technical assistance, Bangladesh secured competition for the concession, avoiding problems created elsewhere in Asia where acceptance of unsolicited bids resulted in high-cost, unsustainable contracts that were sometimes tainted with allegations of favoritism and corruption.
(ii) Several closely related contracts (concession, power purchase, and energy supply) could be drawn up in parallel. This complex process requires specialist contract management skills, which ADB was able to mobilize for the benefit of the Bangladesh authorities.
(iii) The project was structured to minimize costs by allocating risks to the parties that are best able to manage them: (a) the developer bears the capital cost variation risks; (b) the operator bears the risks of providing capacity/availability; (c) the buyer bears the market demand variation risk as it manages dispatch and can minimize national costs of supply using the entire supply system; (d) ADB helped mitigate the credit risks for the sponsors and co-financiers through its participation in the project as a financier; and (e) energy cost variation risk is a pass-through cost to the buyer, who has the potential to pass this cost on to final consumers in the retail tariff.

Source: Operations evaluation mission.

2. Public-Private Participation

44. ADB has invested in a few projects with significant public sector inputs, which are private public partnership investments rather than IPPs. The Nam Theun 2 (Lao PDR) hydropower plant (footnote 15) will operate as a BOT generator. Risk sharing between the operators and the Thailand offtakers has been effectively implemented and conforms to ADB energy sector policy and recommendations.

45. ADB has begun promoting a public private partnership in the energy sector in Viet Nam for the O Mon and Mong Duong projects. TA was provided to develop the necessary framework and legal documents in preparation for the bidding for O Mon. For each project, Electricity Viet Nam will be the anchor for the project and capacity expansion will be provided by the private sector. ADB public sector funds will be used to finance the common infrastructure, which will reduce the risk and costs of the private sector investors and result in lower energy prices.

3. Unbundling of the Electricity Sector

46. The unbundling of the energy sector involves separating government responsibilities for sector policy from the regulation of the industry to ensure an equitable balance between the interests of investors and consumers (see Appendix 3). It also involves splitting power sector monopolies into generation, transmission and distribution companies. The unbundling is an important step on the road to corporatization and possible privatization as it enables greater private sector involvement. Asian countries have pursued unbundling policies with varying degrees of success and ADB has supported this type of sector reform in many DMCs. While there has been little progress in Sri Lanka, other countries (e.g., Bangladesh, India, Pakistan

and the Philippines) are at different stages in the unbundling process, supported in part by ADB sponsored reform programs**.** ADB also provided some TA that positively supported the restructuring of the energy sector in the PRC, a process which was planned and managed by the government and not by donors. Appendix 3 provides more detailed information on these projects.

47. Unbundling the power sector has proven to be a lengthy, difficult process in many countries. In Pakistan, new distribution companies are being created slowly from the unbundling the Water and Power Development Authority. In Bangladesh, the Dhaka Electricity Supply Company has been created and given financial and managerial autonomy but it is not able to set its own tariffs which are decided by government. In India, in Assam, Gujarat and Madhya Pradesh some progress has been made in retail unbundling but there are continuing discussions over the number of retailers in Assam and progress towards independence is slower in Madhya Pradesh. All three states in India maintain the same tariffs for all retailers. In Sri Lanka, no progress has been made on unbundling. In the Philippines, the power sector is unbundled but many of the electricity cooperatives which dominate the retail business outside Manila are insolvent, fail to pay for power purchases and require restructuring.

48. The outcomes from ADB's participation in the unbundling process has led to more financially viable organizations in the power sectors in Bangladesh, India, Indonesia, Pakistan, and the Philippines. Complete privatization of the power sector was the ultimate aim in the 1995 Energy Policy and the 2000 Review. However, the outcomes from the successful restructuring indicate that some of the efficiency gains expected through privatization can also be achieved by public sector companies.

49. The generation and transmission sectors can be restructured, with individual power stations or groups of stations becoming generation companies and the transmission grid remaining as a single entity. However, distribution raises challenging issues about the way in which it should be restructured. Common issues include deciding the number of distribution companies, the governance structure, the degree of independence of the new companies, policies for reducing financial and technical losses, need for financial restructuring and how to extend electrification to rural consumers. Unbundling is still work in progress across the Asia Pacific region and further assistance will be required to maintain the reform momentum.

4. Independent Regulation

50. ADB has provided assistance to the regulator in the Philippines (i.e., Energy Regulatory Commission) and state regulators in Assam and Gujarat in India as well as supporting the Central Asia Regional Economic Cooperation (CAREC) region's regulatory group. In Sri Lanka and Pakistan the World Bank has supported the regulator as part of an agreed division of labor in the sector with ADB. Regulations and regulatory capacity in the power sector have been developed with ADB assistance in India and the Philippines. Fair competition[18] and open access regulations are being developed and administered by regulators. This has enabled open access to new players and the development of rules and sanctions to enable fair competition.

51. Independent regulators help assure the viability of the power sector, promote the efficient use of capital and protect consumers from monopoly pricing and operations from the

[18] A good, well enforced competition law can assist the building of a market economic infrastructure by protecting fair competition, preventing and checking monopolistic behavior and maintaining an orderly market place. Such laws are designed to prohibit monopolies from wielding their market status to curb competition, fix prices, enforce package sales and refuse or enforce trade.

politicization of tariffs. They require new skills and significant technical and financial assistance. Regulators require considerable time to understand their role in changing markets, and to effectively make use of their discretionary powers. Evaluation indicates that institutional strengths in a newly created regulatory framework are generally weak and that the necessary funding may not be readily forthcoming to develop the requisite depth and independence of the human resources.

52. Good tariff regulation promotes the recovery of total long run cost, reduces subsidies and removes cross subsidies within and across tariffs. The evaluation study on Cost Recovery in the Energy Sectors (footnote 14) identified many countries which were not fully recovering costs. However, more progress has been made since the completion of that evaluation. India is now committed to reducing cross subsidies to no more than 20 percent of the cost of supply and recovering the full cost of supply. The Philippines is committed to removing all subsidies. In Pakistan, the regulator has approved tariffs intended to fully recover costs.

53. In India, the creation of independent regulation has proven to be a significant help in removing the politics from tariff setting and creating an environment in which the power sector can become more commercially focused. Regulators at both central and state levels are demonstrating clear independence and using the internet and other publicity material as vehicles for transparency. Appointment processes are sound and regulators are moving towards financial independence by collecting revenues from the utilities rather than through state budgets. Considerable effort is being expended to communicate responsibilities and independence. For instance, the Central Electricity Regulatory Commission regulator and the three state regulators visited during the evaluation study ensure that official (State or Central Governments and their agencies) communications to, and from, their commissions are made public through their official web sites. Consumer participation in the regulatory process was being mentored by the regulators in for instance Assam and Gujarat states, and the regulators take into account both supply and demand side concerns. State and Central regulators are increasingly taking a performance based approach for setting rates, although the major revenues portion is still established through a normative cost plus basis.[19] The OEM observed that state regulators have set agreed targets with the distribution sector for loss reductions, collection efficiencies and merit order dispatch of State owned generation assets.

54. In Pakistan, the regulator is also performing in an independent and more transparent manner and is helping to create a better commercial structure for IPPs, albeit with some disputes. However, retail tariffs still have to be confirmed by government after regulatory approval. This has impeded moves to commercial management in the utilities.

55. Progress in the Philippines has been more mixed with both political interference in tariff setting and the risk of appeals to the Supreme Court diminishing the regulator's effectiveness and subsequently create regulatory uncertainty for potential bidders for the assets due to be privatized. Oversight of the market through the application of the competition law funded by ADB has also been the subject of legislative oversight, with a recent inquiry being held into the bidding behavior of market participants in response to increased fuel costs.[20] The responsibility for this lies primarily with the Philippines Electricity Regulatory Commission. However, political

[19] At present, in the cost-plus structure, Central Electricity Regulatory Commission generation regulations provide for recovery of full fixed charges at 80% availability and incentive payment above 85% availability, subject to actual dispatch. Normative financing has been set at 30:70 equity to debt ratio, and regulated assets are allowed a 14% return on their equity.

[20] Operations evaluation mission.

and judicial interventions have created regulatory uncertainty for potential bidders for the assets due to be privatized.

56. In Bangladesh, the appointment of a regulator took place later in the reform process than elsewhere in the Region. This has delayed independent tariff setting and the sector faces a continuing financial crisis. In Sri Lanka, a regulator is in place but has not yet been given responsibility for the power sector. Most regulators have made their initial tariff decisions for a single year and on the basis of a cost based model. However, they appreciate the potential benefits of moving towards multi- year performance based regulation. Regulators in India are making moves in this direction. The regulator in the Philippines[21] adopted performance based regulation (see Appendix 4).

57. Funding and encouraging independent regulation has been a key factor in promoting commercial practices in the region. Regulators are learning from one another and from international best practice. In discussions during the evaluation, regulators raised issues related to financially competitive salaries, career structures for regulatory staff, training staff, and develop methods of achieving financial independence and means of sharing information about best practice. ADB has promoted dialogue between power sector regulators and policy developers through TA. Regional cooperation initiatives for regulators in the Greater Mekong Subregion and Central Asia have also been powerful tools in sharing and promoting best practice.

5. Restructuring and Privatization

58. There have been several sales of power sector assets in the Asia Pacific region. In the Philippines, as part of ongoing ADB supported reforms to assist restructuring and privatization, some generating stations have been sold to private investors. The sale of the Philippines transmission company franchise was postponed several times through failed bidding and uncertainty over the structure of the franchise. There have also been failures in the sale of some generating plants. In India, some shares in National Thermal Power Corporation have been sold to the public through a stock offering, although the Government continues to be the majority shareholder. In Pakistan, the Karachi Electric Supply Company was sold to a consortium led by a local investor. In Bangladesh, some distribution areas have been transferred from Dhaka Electricity Supply Authority to cooperatives. However, in general privatization has been slow and difficult with some failures and those which have been completed taking longer than expected.

6. Promoting Good Governance

59. The term governance is used in this evaluation to describe the complex set of policy processes and control relationships which occur between the various players in the energy sector. Weak governance and the resulting lack of effective financial and monitoring systems in the electricity sector resulted in poor decision-making and the proliferation of opaque transactions can lead to power service utilities being used as an instrument for political patronage and the exercise of public power for political gain.

60. The lack of good governance has been one of the major impediments to energy reform processes and is often synonymous with: (i) lack of stable political support, (ii) the lack of rule of

[21] The Philippine Transco and Distribution regulations, including competition legislation, were formulated as part of ADB's support for the restructuring of the Philippine electricity sector.

law, (iii) presence of weak institutions to implement reforms, and (iv) the presence of widespread corruption. These are some of the bottlenecks that have prevented the energy sector from effective operation and delivery of reforms that lead to sustainable operations and efficient delivery of electricity.[22]

61. To address these issues, good corporate governance became one of ADB's major operational priorities in the 2000 Review. Operational challenges and issues included: (i) establishing modern financial control systems; (ii) achieving cost effective procurement of goods and services; (iii) improving the productivity and efficiency of power systems; (iv) reducing losses in power transmission and distribution; and (v) controlling theft and corruption. The 2000 Review states that these issues can be best addressed by ADB helping to improve governance in the sector's operation.

62. ADB has used covenants in loans to try to increase governance levels.[23] Some projects have included explicit courses of action related to good governance and anti-corruption measures. [24] Most projects adopted standard ADB guidelines on use of consultants, procurement, financial analysis, auditing, and incorporation of the social dimension. As a result of ADB assistance, many DMCs have introduced private sector style corporate governance measures for their energy sectors while retaining public sector ownership. The techniques adopted include**:**

(i) Creating companies under the Companies Act rather than as public corporations with the intention that they should act commercially even though they are publicly owned. Examples include the creation of the Dhaka Electricity Supply Company and the Power Grid Company of Bangladesh and the various successor entities to State Electricity Boards in a number of Indian States. The Lanka Electricity Company in Sri Lanka is a long standing example.
(ii) Bringing management into utilities from the private sector at senior levels, often on term contracts (Gujarat State, India)
(iii) Appointing non executive directors with relevant private management expertise to distribution companies (e.g., the newly created distribution companies in India and Pakistan).
(iv) Basing appointments and promotions on merit rather than length of service as non-performance related factors. The state government in Gujarat, India has created a structure to ensure that senior power sector appointments are made on merit and at arms length from the government.
(v) Franchising meter reading and bill collection to private companies (India).
(vi) Equitable risk sharing in PPA contracts (Bangladesh, Lao PDR).

63. These measures are having positive effects, particularly in the generation and energy distribution sectors. Competitive, transparent bidding is bringing down the cost of capital equipment (see Box 1), and financial viability is slowly returning to the distribution sectors. In India, the Gujarat State Electricity Board has managed to return to a profitable organization, with reduced subsidies and no real increase in tariffs over 4 years as a result of improved governance measures introduced as part of ADB loan requirements.

[22] Rao G.P. 2006. World Bank Energy Week.
[23] An illustrative sample of covenants is set out in Appendix 5.
[24] All the loans reviewed by the Operations Evaluation Mission included conditions to enhance transparency, accountability and participation. The evaluation also reviewed a random selection of 21 out of 130 technical assistance documents prepared in 2001—2005 and found no explicit governance and anti-corruption provisions.

64. In the electricity industry, the major sources of corruption include grand scale petty theft and smaller scale, high value procurement kickbacks and politically driven intervention (footnote 22). There are a few good practice examples of these issued being addressed in recent loans; (i) theft of electricity is being reduced through governance measures which include matching of feeder loads and meters (see Box 2); (ii) the unbundling of utilities which allows for comparisons of financial performance and the disaggregation of costs and revenues by utility functions (Bangladesh, India, the Philippines, and Sri Lanka); and (iii) the introduction of consumer inclusivity by regulators which promote and enforce consumer interests in transparent decisions (India, Pakistan and the Philippines). Furthermore, these measures are relatively permanent, as they are applied at the institutional level and appeared to be having very high levels of success.

65. Despite the application of standard governance and anti-corruption requirements in the loan agreements for energy projects, some attempts to circumvent procurement processes have been detected. By July 2006, ADB's Integrity Oversight Committee had imposed sanctions in 10 cases of proven fraud and corruption in the energy sector, all of which involved actions which occurred during the procurement of goods and services, and other cases are under investigations (Table A5.2, Appendix 5 summarizes actions taken). Attempts to ring fence ADB projects to prevent them from being infected by corruption have not been totally successful. Also, anti-corruption measures and monitoring of these in ADB funded projects does not ensure that these measures will be applied to other funds used in the energy sector.

66. The above suggests that some efforts are being made to improve governance across the energy sector and reduce the opportunities for corruption in the energy sector. However, these processes are slow to implement, and political resistance to changed organizational operations and structures have caused delays. The lack of adequate information technology and electronic billing and accounting systems, for instance, has been an impediment to a faster roll-out of better governance measures in India. Also, independent regulators are not a feature of all energy sectors in the region. Another impediment was noted in Madhya Pradesh State in India, where 40,000 cases of prosecution for theft are in the courts. Delayed court decisions may give the impression that anti-corruption measures are not implementable or are ineffective.

67. The purpose of ADB's *Anticorruption Policy (*1998) is to reduce the burden corruption exacts from the governments and economies of the region. It has three objectives: (i) support competitive markets and effective public administration, (ii) support explicit anticorruption efforts, and (iii) ensure ADB-financed projects and its staff adhere to the highest ethical standards. The 2000 Review paid little attention to corruption, mentioning the word only twice in the context of (i) energy shortages create opportunities for corruption; and (ii) power purchase agreements associated with the IPPs. However, weak governance and incidence of corruption prevail in energy sector operations in many DMCs.[25] ADB's second Governance and Anticorruption Action Plan (2006) focuses on: (i) improved identification and management of governance and corruption risks in country strategies and programs, and annual country portfolio review missions; (ii) strengthened governance and anticorruption components in program and project design; (iii) strengthened program and project administration and portfolio management; and (iv) improved organizational structure, human resources and access to expertise. Its success will depend upon how effectively the plan is implemented.

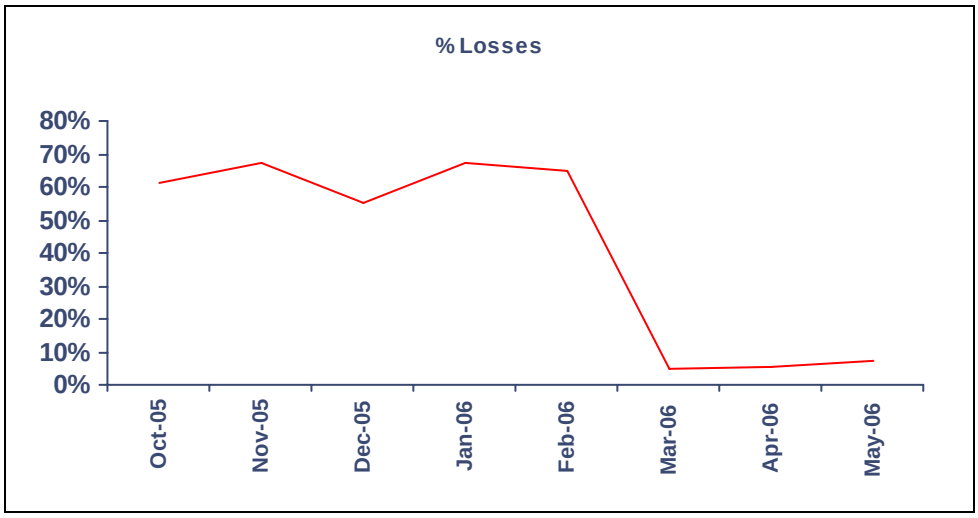
[25] The World Bank's recent research also underscore sector level governance risks mitigation, see *Corruption in the Electricity Sector, A Pervasive Scourge in the Many Faces of Corruption Tacking Vulnerabilities at the Sector Level,* in World Bank 2006, Many Faces of Corruption, Washington DC.

68. Although some corruption risks are common across sectors (e.g., procurement), other types of corruption vary by sector. Sector level governance is important and ADB's Second Governance and Anticorruption Action Plan emphasizes this level of governance. Consistent with this approach the energy strategy should provide staff with more guidance on how to address corruption in the energy sector, in particular how to reduce opportunities for corruption. Examples of types of corruption can occur at different phases of the project cycle in the energy sector are shown in Appendix 5.

Box 2: Reducing Non-technical Losses in Assam, India

Electricity losses can have major adverse impacts on the financial performance of power utilities. Costs are incurred to produce and transmit the electricity but no revenue is received. It is not always clear how much of the losses are technical losses and how much results from the theft of electricity. Experience under an Asian Development Bank funded project in Assam State in India demonstrates that this problem can be successfully addressed. Strong leadership was provided by the regulator to enforce metering of feeders and set loss reduction targets. Transparency and accountability were improved by matching feeder data to Asian Development Bank funded computerized customer billing data. This allowed losses to be clearly identified as resulting from technical reasons or theft and the specific areas where problems were occurring. The figure below illustrates the positive impact of these initiatives in terms of significantly reduced losses. Because of this initiative and other measures to improve efficiency, the financial performance of the sector is improving, even in the absence of tariff increase. This example is being replicated in many other Indian state electricity boards, in Pakistan and the Philippines, and could be more widely adapted in other developing member countries.

Results from a Pilot Loss Reduction Program in Assam



Source: ADB. 2007. *India Energy Sector Assistance Program Evaluation* (Forthcoming).

7. Internet and Information Technology

69. The 2000 Review was written at the height of the Internet boom. In the circumstances it is not surprising that it places particular emphasis on the internet and information technology. It proposes that information technology applications could enhance transparency, reduce transactions costs and improve customer services and suggests that ADB should "assist in developing computer software for system operations and power exchange…" Many of these hopes have been realized over the past five years. Regulators are using the Internet to make their decision making more transparent. Utilities are using the Internet to communicate and

implementing new information technology systems to improve financial and commercial management.

70. The use of information technology is now commonly viewed as being fundamental in improving corporate level as well as sector level governance. The use of the Internet and information technology systems is now standard practice in utilities around the world. ADB has little, if any, comparative advantage in advising on the use of information technology and still less on the direct development of software. This can be more appropriately undertaken by specialist firms. The particular emphasis on Internet and information technology is less relevant in current circumstances and should therefore be reduced in ADB's revised energy policy and these activities should be treated as part of the mainstream in managing a modern utility and/or regulator.

8. Conclusions for Private Sector Participation

71. There is clear evidence that the 2000 Review influenced ADB's private sector operations in the energy sector. Since 2000 Review was adopted, ADB has been involved in the design of a number of the major sector restructurings, for example, in Bangladesh, India, the Philippines, Pakistan, and Sri Lanka. Sectoral reforms helped to improve the enabling environment for private sector investment in many DMCs. There was a two way interaction. The policy helped to determine ADB's subsequent programs. But these programs, along with extensive discussions with other development partners and with the World Bank in particular, led to an evolving consensus on the desirability of power sector restructuring. This in turn, contributed to ADB's 2000 Review. The broad outlines of the 2000 Review have been translated into specific programs tailored for the political economy of the DMCs. ADB funded projects and programs have had considerable success in supporting the objective of enhancing private sector involvement. Particularly for generation, a fall in public sector investment funded by ADB was offset by a substantial increase in the number and value of private sector transactions involving ADB. This change in the composition of ADB lending is consistent with the objectives of the 2000 Review. Progress in restructuring the power sector has been slower and more difficult than anticipated in every country. In India, the restructuring undertaken in ADB led projects in Assam, Gujarat and Madhya Pradesh has improved the financial performance of these state electricity boards, and in the Philippines the electricity sector as a whole returned its first profit for many years in 2006. Overall, promoting private sector participation and principles helped to increase efficiency in the power sector. Capital and operational efficiency provided through private sector participation and independent regulatory control has freed public resources for other interventions.

72. The more recent sector reform projects (2001—2006) and accompanying TA in India were rated as successful by the field study undertaken by the evaluation. The overall level of success is higher than the sector reforms in the previous period in Bangladesh and the Philippines. This indicates that lessons drawn from the previous period (1996—2000) and a shift in strategy for greater commitment from DMCs have been effective in delivering the desired reforms.

73. ADB's private sector operations have been material both in terms of helping catalyze industry reforms and public sector lending through TA to improve the enabling environment, and through direct investment that helped reduce financiers' concerns about project risks. Cooperation between ADB's public sector and private sector operations has facilitated private sector investments in the energy sector. PSOD projects have had positive catalytic effect on funding. The private sector projects reviewed in Bangladesh, India, the PRC and Sri Lanka also

had positive and sustainable effect on business practices. These effects include (i) world best practice operations, (ii) exemplary safety records, and (iii) good community relations.

D. Regional and Global Environmental Impacts

74. One of the four strategic objectives in the 2000 Review was to help reduce adverse regional and global environmental impacts. Since the 2000 Review, considerable work has been undertaken on the science[26] and economics (footnote 9) of GHG emissions and climate change. ADB has implemented energy efficiency initiatives, renewable energy, and clean development mechanisms (CDMs) initiatives, which all promote a reduction in greenhouse gases. Energy efficiency initiatives have multiple positive effects (i) reducing input costs of capital and materials required to produce the energy, (ii) decreasing the effect of greenhouse gas emission on the environment, and (iii) increasing the fuel security of the energy consuming countries as imports are reduced.

1. Energy Efficiency

75. The 2000 Review maintained the objective of the 1995 Energy Policy in promoting energy efficiency, and which cuts across various operational priorities identified in the policy. While ADB energy policies have included these initiatives for many years, ADB's records show that there has been little direct support for energy efficiency investments as a direct result of low energy prices and inaccurate accounting.[27]

76. Firstly the readily available and inexpensive fossil fuels and the cost of the technologies to convert these to electricity were less expensive than the higher priced and more commercially risky alternatives. For most of the 1990s the price of oil was $20 per barrel or less. Also, the science and cost of externalities (e.g., anti-pollution, greenhouse gas abatement) was less well known or ignored when options were considered for energy investments. In such circumstance it should not be surprising that there was little demand for loans for energy efficiency or renewable energy. ADB's initial focus in energy efficiency, clean energy and renewable energy was on capacity building and the identification of projects suitable for these interventions, in order to develop a pipeline of projects for funding.

77. Secondly, ADB's accounting understates its contribution to energy efficiency. ADB has supported many projects that contribute to energy efficiency but are not recorded as such. For example, projects that upgrade overloaded transmission and distribution, will lead to reductions in technical losses and a corresponding decrease in generation requirements contributing to energy efficiency, lowering the cost of supply and leading to a subsequent lowering of greenhouse gas emissions. This issue goes far beyond the energy sector. There are water supply and irrigation projects that contribute to energy efficiency by using variable speed motors or replacing a large number of inefficient lift pumps. Also projects for district heating and town gas supply have increased energy efficiency and lowered coal use. Efforts are underway to correct this measurement problem.

[26] Intergovernmental Panel on Climate Change.

[27] ADB's investments in energy efficiency included a $150 million credit line for Industrial Development Bank of India, used for large industrial energy efficiency projects (1995); a $100 million credit line to India Renewable Energy Development Agency used primarily for industrial bio-mass cogeneration, waste heat recovery and wind energy projects (1997); and equity fund investments in FondElec Global/Asia Clean Energy, Asia Clean Energy Fund (2003) and China Environment Fund (2003).

78. The evaluation examined energy efficiency initiatives that were built into ADB operations in the energy sector, including both supply side and demand side measures. The results summarized below indicate that ADB has had a more positive impact on energy efficiency than is apparent from the listing of projects that have energy efficiency in their name. ADB's energy efficiency assistance was focused on helping DMCs in the design and implementation of measures to improve efficiency of energy supply and use (common to the 1995 Energy Policy supply side measure and demand side management), including reducing technical and non-technical power losses.

79. **Supply side measures** to encourage energy efficiency and conservation include (i) encouraging utilities to rehabilitate and retrofit old generating units and substations to optimize operational efficiency and prolong their useful lives (heat rates of many conventional thermal power plants can be reduced from about 13,000 Btu (British thermal unit) per kWh (kilowatt hour) to about 10,000 Btu per kWh); (ii) encouraging efficient and economic operations and maintenance practices such as load management to shift peak demands to off-peak periods; and (iii) promoting technologies such as cogeneration, which simultaneously improve fuel consumption efficiency and reduce environmental emissions.

80. The field study undertaken for the evaluation reviewed the energy efficiency implications of two projects in the PRC: (i) Shanxi Environmental Improvement Project; and (ii) the Yunnan Dachaoshan Power Transmission Project. Under both projects, inefficient boilers were replaced with alternative sources of more efficient energy. Although these loans were approved before the release of the 2000 Review, they were relevant in operationalizing the objectives and of the policy. In both projects, significant capacity was developed by the executing agencies for better environmental planning. In Shanxi, a large scale monitoring program has been established to assess long term economic, social and environmental effects. The project also demonstrated the link between better energy efficiency and reduced air pollution.

81. The field study of the evaluation rated the PRC projects reviewed as "highly successful". The Shanxi projects are seen as nationally important pilot project which can be replicated at local and national levels and have contributed to national and provincial environmental policies. In the project completion report the economic internal rate of return for the Shanxi projects was conservatively estimated by not quantifying the environmental or health improvement benefits. The recalculated economic internal rates of return for the three subprojects are respectively: 14.5%, compared with 23.9% at appraisal; 19.0%, compared with 14.1% at appraisal; and 16.1%, compared with 26.6% at appraisal. If the local and global environmental benefits were considered, the rates of returns increase to 19.7%, 28.6% and 37.7% respectively. These will be better captured once long term benefit monitoring is concluded in the region. The evaluation estimated annual environmental benefits of the Shanxi project at $24 million (Table 6).

82. In Yunnan ADB financed a transmission project to bring hydropower to Kunming. As part of the project design, three coal fired power plants (Penshuidong; Kai Yuan and Xuan Wui) were closed. Sulphurdioxide) and ash precipitation were reduced each year by 12,000 tons and 25,000 tons respectively and a large power plant was relocated from the central city. The estimated economic benefit of the SO_2 reduction is $30[28] million per year. The project realized the world's largest CDM trade at the time; however, ADB was not able to perform the transaction.

[28] State Environment Protection Administration, estimates the net economic benefit of one ton of sulphur dioxide at $2,500 equivalent.

Table 6: Estimated Annual Benefits from Pollution Reductions in Shanxi

	Tons	$/ton	Annual Value $ millions
Sulphur dioxide (SO_2)	8,771	2,500[a]	21.93
Carbon dioxide (CO_2)	5,840	10	0.06
Methane (CH_4)	7,685	250	1.92
Total			23.91

[a] Estimates of SO_2 value.
Source: Estimates of the State Environment Protection Administration, People's Republic of China, 2006.

83. The PRC projects illustrate two important factors that contribute to development success: local participation and demonstration effects. The evaluation observed a high level of participation among the local and provincial government officials, local environmental bureaus and the private sector, which suggests that these projects are sustainable. Based on the evaluation mission's meetings with the local and the provincial officials, there was strong executing agency ownership and involvement in the project in terms of decision making, local funding and management. The projects are part of the provincial environmental master plans and received strong support from the provincial government that will help to ensure long term sustainability. Another important contribution of the projects is demonstrative effects. These projects have been used as a learning experience for other interested institutions and provinces. This is a good example of how ADB can help to achieve development results that extend well beyond individual projects.

84. **Demand side measures** include: (i) encouraging utilities to incorporate into their energy planning models the key elements of integrated resource planning; (ii) organizing in utilities an adequately staffed demand-side management group to plan and undertake demand-side management activities; (iii) supporting such groups with appropriate training programs; and (iv) using TA to prepare demand-side management master plans and components to be included in projects. Demand side electrical and thermal energy efficiency projects are undertaken to improve end-use energy consumption, managing energy or adopting efficient technologies or processes. The Asia Least Cost Gas Abatement Strategy (ALGAS) project assessed the potential for of energy efficiency improvements in some of the energy intensive sub-sectors and concluded that energy savings from 30% to 50% are technically feasible in many industries and many countries. Energy efficiency measures may be implemented either as "efficiency retrofits", in which existing installations are improved through replacement with energy efficient components or as energy efficiency investments at the design and planning stage by adopting high performance technologies (See Appendix 6).

85. An ADB financed study[29] completed in 2003 produced a framework for developing demand side energy efficiency initiatives for the Indian Bureau of Energy Efficiency which is implementing the study's recommendations together with the state electricity boards and community organizations. These included energy efficiency labeling programs, development of accreditation of energy auditors and development of pilot projects to demonstrate the benefits of energy efficiency. The evaluation rated the outcomes as successful and highly sustainable.

[29] ADB. 2002. *Technical Assistance to India on Preparing the Energy Efficiency Enhancement Project*. Manila (TA No. 3885).

86. In the 1990s ADB financed a number of industrial demand side energy efficiency and pollution abatement projects, mostly involving state owned enterprises in the PRC. These projects involved replacing old, outdated production technologies with modern, energy efficient cleaner production technologies. Of the 11 such loans, 9 were rated as successful and 2 as partially successful upon completion. In the successful projects, energy was increased and pollution was reduced.

87. ADB projects have demonstrated clear links between energy efficiency initiatives and the resulting improvement in environmental conditions. Box 3 below gives some illustrative examples of this effect.

Box 3: Energy Efficiency Projects that Improved the Environment

The People's Republic of China's energy policy objectives have progressed slowly from being production and distribution centered with the primary objective of facilitating rapid economic growth to promoting more sustainable growth, with greater concern for the environment. The Shanxi Environment Improvement project in PRC helped to improve the air quality of Taiyuan, Datong and Yangquan through the replacement of inefficient methods of energy generation. Ambient air quality improved due to the project. In Yangquan, for example, the district experienced Class II air quality only for 7 days in 2001. This had risen to 225 days in 2005. Similarly, Datong municipality Class II air quality conditions rose from 48 days in 2001 to 220 days in 2005. As a result of the Project, substantial reductions in air pollution have been observed.

An Energy Conservation Project in Mongolia was designed to: (i) improve district heating reliability and reduce losses by rehabilitating critical sections of Ulaanbaatar's district heating systems, (ii) encourage end-use energy conservation through improved metering and demonstration projects, and (iii) improve operation and maintenance. The evaluation found that between 1999 and 2003, water flow per unit heat in the district heating network decreased by 13.7%.

Examples of savings from demand-side energy efficiency projects in the PRC include for instance: (a) for a cement plant, electricity consumption per ton of production fell by 22% and dust emission were reduced by nearly 7,000 tons per year; and (b) for a caustic soda factory replacing old mercury and diaphragm plants resulted in a 36% saving in the tons of standard coal equivalent per ton of caustic soda produced.

Source: Operations evaluation mission.

a. Energy Efficiency and Tariffs

88. Price signals can be used to encourage energy conservation and efficiency of energy use and capital. Demand side initiatives, in particular, time of use (TOU) tariffs, have been successful in improving resource use in several DMCs (Appendix 7). In the Indian state of Gujarat, the State Electricity Board bifurcated all rural feeder lines. Agricultural consumers now receive power for eight hours a day, off peak, at a concessionary rate. Rural households and villages are supplied continuously from a separate feeder. Because agricultural power is no longer supplied at system peak, 500 MW has been removed from the peak load and the load curve is almost flat. This load pattern improves the efficiency of the power sector and reduces the need to invest in peak load generation capacity. Households now have continuous supplies while farmers appreciate the improved reliability for the eight hour connection period and have accepted the change. In the state of Assam, an optional time of day tariff was introduced. This moved about 7% of demand away from the system and made the load curve significantly flatter. Consumers appreciated the new tariff and the resulting improved reliability of supply.

89. In Hunan Province in the PRC, TOU tariffs were introduced. This encouraged a shift of 1,200 MW from peak to off-peak periods, freeing up reserves. Guanzhou and Shanghai have

introduced similar tariffs and report significant shifts in consumption. Fujian Province has lower tariffs for energy efficient industries and a penalty tariff for low efficiency "sunset" industries. KVa tariffs have been widely implemented in the PRC, and to a lesser extent in India which encourages the use of power factor correction.[30]

90. The experience gained under these projects demonstrates that TOU tariffs enhance supply side efficiency by reducing the need for investment in additional peaking plants as load is shifted from peak to off peak. The load shift also releases capacity in transmission and distribution. TOU wholesale pricing (supply side TOU) encourages the development of plant to serve peaking loads (India, the Philippines) (Appendix 7). These evaluation findings indicate that market based signals in the form of TOU tariffs can be a powerful incentive to encourage energy efficiency initiatives. Tariffs can be used to encourage the customers of electricity utilities to change their behavior in ways that result in energy conservation, less capital investment and less emission from the energy sector.

2. Renewable Energy and Climate Change

91. Overall, ADB's lending for renewable energy has been very limited, accounting for about 3% of the total energy sector lending (Table 3). ADB has mobilized several donor funds to promote renewable energy, climate change, and energy efficiency. The evaluation reviewed the Indian Renewable Energy Development Authority (IREDA) Project that funded 318 MW of wind, biomass cogeneration, landfill gas and solar energy projects. Renewable energy projects avoided increases in emissions that would otherwise have been produced by fossil fueled plants. The project has had a catalytic effect on mobilizing funding for the renewable energy sector, and has led to sustainable private sector investment and financing of wind generation. IREDA has become a successful source for ongoing financing of new renewable energy projects, although competition from commercial banks, and a lack of inexpensive funds, has limited their capacity to fund wind power projects. Expertise gained by IREDA has led to them be recognized as the leading source for appraisal of renewable energy projects and for funding viable cogeneration, solar and landfill gas generation projects. Both changes in investors, who are now predominately driven by energy generation rather than (previously) fiscal incentives, and better project appraisal skills, are reflected in the improvement of the company's balance sheet.

92. ADB's experience with a wind power project in the PRC demonstrates the commercial viability challenges faced by renewable energy projects. This $58 million loan was approved in 2000 and was designed to finance 78 MW of generating capacity in wind farms in three provinces – Xinjiang, Heilongjiang and Liaoning. However, the loan was cancelled and not implemented because the tariff needed to make the wind farms commercially viable far exceeded the cost of generating electricity from coal fired thermal plants. The lesson from this experience is that the legal/policy/regulatory framework needs to be in place to encourage investment in renewable energy. The PRC adopted a Renewable Energy Law in 2006. This, together with the increased price of coal and oil and a fall in the price of wind turbines has improved the investment climate for wind power.

93. Increases in the cost of energy and a growing awareness of the environment/energy nexus have contributed to an increase in ADB funding for renewable energy. Recent projects

[30] Power factor is the ratio between the KW and the kilovolt amperes (KVA) drawn by an electrical load where the KW is the actual load power and the KVA is the apparent load power. It is a measure of how effectively the current is being converted into useful work output and more particularly is a good indicator of the effect of the load current on the efficiency of the supply system.

include: (i) a $161 loan for renewable energy in Indonesia; and (iii) a $515 million Multitranche Financing Facility for renewable energy development in Pakistan. The private sector can also play a role in financing target renewable energy and energy efficiency projects. ADB has invested in two equity funds [e.g., Asia Clean Energy Fund ($20 million, 2003) and the China Environment Fund ($10 million, 2002)].

3. Clean Development Mechanism Projects

94. Consistent with the objectives of the 2000 Review, ADB has supported pilot projects to help DMCs use the CDM through the CDM Facility (CDMF)[31] launched in August 2003 for a three year pilot period. The objective of this facility is to help DMCs to benefit from the CDM in achieving sustainable development in three ways (i) by sourcing funds for emission reductions; (ii) by processing CDM requirements for identified projects; and (iii) by providing information and advice on the emerging carbon markets. The facility aims to add value to projects in ADB's lending portfolio by providing support during the project preparation stage. Projects supported by, and marketed through, the CDMF have attracted competitive offers from buyers. There is now greater awareness of CDM opportunities in ADB and several project-related TA projects now incorporate assistance for CDM-specific components. However, there is still a need to fully integrate CDM activities into ADB's project processing.

95. The first project supported by the CDMF was the Fuxin Coal Bed Methane/Coal Mine Methane Utilization Project (a sub-component of the Liaoning Environmental Improvement Project) in the PRC.[32] The project is expected to generate approximately 4.5 million tons of carbon dioxide equivalent in carbon emission reductions over the first 7-year crediting period. ADB's $70 million loan and the $15.8 million for certified emissions reduction financed half of the $161 million cost. The carbon credits have an estimated net present value of above $40 million. The CDMF has also supported several waste management projects, including the Shandong Hai River Basin Pollution Control Project.[33] This component is reflected in the design and financing plan and ADB will continue to assist through the marketing of the resulting emission reduction credits.

96. The CDM component of the Uttaranchal Hydropower Project[34] is currently at the validation stage. The CDMF's process has been synchronized with the actual processing of the project by ADB project teams. ADB, through the CDMF, is actively assisting the project developer to market the expected carbon emission reductions worldwide.

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[31] ADB. 2003. *Clean Development Mechanism Facility.* Manila (IN 192-03).

[32] ADB. 2004. *Report and Recommendation of the President to the Board of Directors on a Loan to the PRC for the Liaoning Environmental Improvement Project.* Manila (Loan 2112).

[33] ADB. 2006. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the PRC for the Shadong Hai River Basin Pollution Control Project.* Manila (Loan 2337*).* The original design of the three solid waste management sub-projects was to construct a sanitary landfill that would prevent leachate seeping into water bodies, therefore improving environmental conditions of the entire Basin. However, there was no effective control method for the landfill gas, which is both odorous and a safety hazard. Since approximately 50% of landfill gas consists of methane - a powerful greenhouse gas but also a valuable and clean energy source - the CDMF assisted feasibility studies and conducted capacity building seminars to build a gas recovery and utilization component into the project design.

[34] ADB. 2007. *Report and Recommendation of the President to the Board of Directors on a Proposed Multitranche Financing Facility to IND for the Uttaranchal Power Sector Investment Program.* Manila (Loan 2309).

4. New Initiatives

97. ADB's Clean Energy and Environment Program includes the following components: (i) the 2006 Energy Efficiency Initiative to increase energy efficiency investments to at least $1 billion a year; (ii) the Carbon Market Initiative to catalyze greater investments in clean energy; (iii) the Renewable Energy, Energy Efficiency and Climate Change program to promote clean energy; and (iv) establishing knowledge hubs in the PRC, Thailand and India. The details of this program are given in Appendix 6. Given the early stage of implementation, it is too early to evaluate the success of the Clean Energy and Environment Program.

98. Other recent initiatives in the PRC include (i) a project that aggregates industrial and commercial customers and includes specific energy efficiency measures related to air-conditioning, lighting and motors; and (ii) supporting an energy efficiency service company that will implement energy efficiency projects for consumers using a $450 million revolving guarantee to be administered by PSOD.

99. Overall, ADB's contribution to addressing with the regional and global environmental impacts of energy production though energy efficiency, renewable energy and CDM measures, while limited, has provided some experience on which to build for the further development of these initiatives. The impacts of high fuel prices and concerns about the environmental impacts of fossil fuels and hydropower should provide greater impetus for these initiatives in the future. ADB's lending volumes to support such initiatives are expected to increase.[35]

5. Environmental and Social Safeguards

100. In 2000, the World Commission on Dams (WCD) published its global review of dam projects that, while recognizing the important contribution of dams, highlighted several shortcomings including high variability in delivering predicted outcomes, impoverishment of affected communities and limited success in dealing with environmental impacts. Many such problems are attributed to project planning, but often there has been ineffective implementation of mitigation measures during the operation phase. A study of four projects carried out for ADB in 2002 similarly concluded that many problems were associated with project planning and attributed them to weak public participation, inadequate attention to environmental protection measures and monitoring, and lack of attention to livelihood restoration.[36] Post-evaluation of the Nam Leuk hydropower project in Lao PDR raised a number of issues that go beyond the physical implementation timetable of a project, including how to replace lost fisheries and to provide clean water supplies to affected communities.[37]

101. Many of the lessons learnt are reflected in ADB's framework of social, environmental and sector policies, in particular related to the identification of project specific and cumulative impacts and design of mitigation measures. Recommendations from project evaluations have been incorporated into subsequent projects and resulted in improvements in the design and delivery of more sustainable social and environmental mitigation programs in hydropower projects, including the development of baseline data against which to monitor impacts. The design of the Nam Theun 2 hydropower project (footnote 15), which became effective in May

[35] Indicative loan pipelines are in the order of $700 million for 2007 and $1.9 billion in 2008-2009.
[36] TA 5828-REG: *Study on Large Dams and Recommended Practices.* Final Report dated September 2002. The four dams studies were Nam Ngum 1 in Lao People's Democratic Republic, Victoria in Sri Lanks, Magat in the Philippines and Lingjintan in the People's Republic of China.
[37] ADB. 2004. *Project Performance Audit Report on the Nam Leuk Hydropower Projec*t. Manila (Loan No. 1456-LAO SF).

2005, reflected OED lessons from the difficulties experienced under the early hydropower projects, In recent projects, extensive consultations have been undertaken and alternative mitigation options explored with local communities. Livelihood development measures also cover upstream and downstream communities to offset any loss of income from fisheries. Linkages have been developed to complementary programs such as the Biodiversity Conservation Corridors Initiative (BCCI) to provide a more integrated approach to environmental mitigation than possible through interventions on a single project. At a policy level, longer term support to local communities is being explored with the Government through a proposed benefit sharing arrangement.[38]

102. A major NGO concern is the equitable sharing of benefits of hydropower projects. Whereas ADB approaches large scale energy projects with a macro view of costs and benefits, there is a debate about the need for increased equity for those who are adversely affected by large scale projects. Hydro projects in Lao PDR, contribute significantly to its GDP, and part of the project revenues are allocated for spending on social services which should benefit many citizens in the country. Not all local persons affected by projects involving dams have their livelihoods restored. In the Zhejiang Shanxi Water Supply Project[39] about 11% of 35,000 affected households have not been able to restore their 1996 income levels. The post-relocation support plan in 2002 outlined policies, principles, measures, and a budget for a 10-year plan; and identified institutional arrangements for plan implementation. However, OED evaluation concluded that there were insufficient funds to implement the plan.

103. An OED evaluation documented environmental problems associated with the coal fired Mae Moh Thermal in Thailand. ADB had supported this large project with a series of loans approved between 1972 and 1986. NGOs raised legitimate concerns about the air and water pollution associated with the project that adversely impacted on environment and people living in the areas. Subsequently flue gas de-sulfurization facilities were installed in 2001/2002 and the level of sulfur dioxide was reduced to meet national standards. OED reports on more recent coal-fired thermal plants in the Philippines and the PRC found that the environmental performance was better.

104. The 2000 Review does not specifically mention ADB's safeguards for the environment, the potential displacement of indigenous people and the general resettlement safeguards inherent to energy infrastructure development. Specific references to these policies should be provided in the updated ADB's policy for energy sector operations.

6. Conclusions to Regional and Global Environmental Impacts

105. ADB energy initiatives have addressed energy efficiency, renewable energy and clean development mechanisms. Some of the energy projects had positive impacts on the environment but in some cases ADB's safeguard policies were not adequate to mitigate adverse environmental and social impacts. ADB's assistance for energy efficiency and renewable energy for most of the evaluation period was mainly focused on robust policy dialogue and capacity development. This has had a high level of success. The expected shift of greater lending priorities for energy efficiency as well as the performance of the new Energy Efficiency Initiative is too recent to evaluate. However, ADB's level of investment in energy efficiency and renewable energy has been far below both the potential and the need. Energy prices have

[38] TA 4689-VIE: *Developing Benefit Sharing Mechanisms for People Adversely Affected by Power Generation Projects*, approved in November 2005 for $150,000.
[39] ADB. 1997. *Loan to PRC for Zhejiang-Shanxi Water Supply Project*. Manila (Loan 1544).

increased significantly since 2000. This fact, together with recent successful ADB efforts to mobilize concessional funds to support the Clean Energy and Environment Program and the growing awareness of the risks associated with climate change, should create more opportunities for ADB involvement in energy efficiency and renewable energy in the future.

106. A similar conclusion applies to ADB's efforts to reduce greenhouse gas emissions from the energy sector and, more broadly to address issues related to global warming. Although ADB has undertaken same policy/advocacy work and has developed a mechanism to promote trading in the framework of the CDM, it remains to be seen whether ADB will be successful in financing a significant volume of investments in this area. Low energy prices, which prevailed during the early part of the evaluation period, did not provide the incentives to invest in these areas.

E. Promoting Regional Cooperation

107. The 2000 Review identified regional cooperation as a priority operation area for ADB in the energy sector. The inaugural meeting of the Electric Power Forum within the framework of the Greater Mekong Subregion (GMS) program was held in Myanmar in 1995. Since then, significant achievements include agreements in hydropower trade and inter-country transmission of energy supplies. To date there have been four regional power projects in the GMS. Two projects involve hydropower development in Lao PDR for export to neighboring countries. The others in Cambodia involve the installation of a transmission line from the Viet Nam border to Phnom Penh.

108. There are three ongoing TA projects and one recently completed TA that intends to open the GMS energy sector to greater opportunities for cooperation (see Appendix 8). Under the GMS Program, cooperation in energy focuses on the development of the regional power market and power trade arrangements, which involves providing (i) the policy and institutional framework to promote opportunities for cooperation in regional power trade; and (ii) essential grid interconnection infrastructure needed for the cross-border dispatch of power. While the GMS region has diverse energy resources to feed the growing demand for electricity, the geographic distribution of these resources is uneven. This provides a strong rationale for promoting regional power trade as power trade can help secure a better balance in energy supplies.

109. Enhanced energy connectivity is steadily being achieved under the GMS program through construction of cross-border power transmission lines. Initially these lines serve to fulfill bilateral but one-way trade arrangements (e.g., export of power from specific hydropower projects in a surplus country) to the grid system of a power deficient country. Even this limited power trade currently taking place in the GMS has generated substantial benefits to the parties--Lao PDR's export of hydropower to Thailand increased its foreign exchange earnings and multilateral and development community is working with the government to strengthen governance issues to ensure that these funds are used to finance development programs.

110. Ongoing projects include the GMS Transmission Project (2003) and the Second Power Transmission and Distribution Project (2006) both from Viet Nam to Cambodia. Currently, the tariff in Sihanoukville ranges from $0.13 to $0.20/kWh. In rural towns, the rural electric enterprises supply electricity at tariffs as high as $0.38-$0.68/kWh. Through these projects, electricity imported from Viet Nam will have a delivered price in Sihanoukville of around $0.08/kWh. The lower electricity prices will benefit consumers, and rural villages and communities close to the transmission line that are currently not served will also be supplied

with electricity. An additional project linking Thailand to Northern Cambodia is expected to be approved in 2007.

111. A regional TA for Developing the GMS Energy Strategy,[40] approved in 2006 aims to expand cooperation among the member countries to meet rising energy needs and helps develop a robust regional energy market. The TA is expected to (i) help articulate a clear vision for GMS cooperation in the energy sector; (ii) formulate an action plan to address sector challenges during 2006−2020 including issues such as social and environmental sustainability, and energy security; (iii) identify priority investment projects including those for private sector financing to intensify energy trade and investment in the region; and (iv) draw up an operating framework to enhance regional energy security. The expected outcome of the TA is the adoption by GMS countries of a regional energy strategy.

112. Although these successful GMS energy cooperation initiatives are consistent with the 2000 Review, the initiation of this activity was an integral part of ADB's GMS Program, rather than something that was driven by the 2000 Review. These activities would likely have happened whether or not regional cooperation was included as an explicit objective of the 2000 Review.

113. The four Central Asian countries in the CAREC region have unified power systems and have existing gas and electricity trading mechanisms. However, ADB's experience promoting regional cooperation in the energy sector in CAREC has been less encouraging. The 2002 Regional Power Transmission Modernization Project for Uzbekistan and Tajikistan tried to build on the existing arrangements but suitable long-term agreements could not be put in place. The aim was to modernize the transmission systems of the two countries and enhance the power trade between them. However, the failure of the two governments to sign the power trade agreement resulted in the cancellation of the two loans for the project. This suggests that the project could have benefited from additional policy discussions prior to the approval of the loan.

114. Trading/cooperation in the energy sector has not been established in the other ADB supported regional cooperation programs although there have been some bilateral cooperation/trade in power between neighboring countries. Noteworthy is the trade in hydroelectric power between Bhutan and India and less so between Nepal and India (limited to power trading along border towns). The cross border power trading between Bhutan and India had a positive fiscal impact on Bhutan, as was the case in Lao PDR.

115. Regional cooperation has been a continuing objective of ADB in the power sector but results have been slow to materialize in some regions. Progress in developing regional power markets has been slow in Central Asia despite ADB's efforts and there has very little progress in South Asia that reflects ADB's involvement. ADB has been effective in ensuring equitable negotiating positions that allow countries to come to agreements and has provided a venue to involve other donors. ADB has provided an institutional mechanism in its GMS initiative through ministerial conferences, forum and working groups to develop priorities and the program itself. In these forums ADB has provided technical and administrative support that has contributed to the progress that is being made in developing the framework to support cross border trading. This institutional development has been complemented by lending to support regional power projects in the GMS. In assessing the achievement of the regional cooperation objective of the 2000 Review, the lack of progress in these regions offsets the good progress in GMS.

[40] ADB. 2006. *Developing the Greater Mekong Subregion Energy Sector Strategy*. Manila (TA 6301-REG).

IV. EVALUATION OF ADB'S ENERGY POLICY

A. Relevance and Strategic Positioning

116. Relevance was examined from the viewpoint of the continuing relevance of the goals of the 2000 Review, taking into account the external context, the changing environment and emerging issues, and the changes in the DMCs' capacities and needs.

1. The External Context

117. ADB's overall operational strategy was designed to support efforts to achieve higher sustainable economic growth, to promote employment, and to reduce poverty. Earlier assistance was focused on improving supply-side efficiency by reducing infrastructure bottlenecks. Subsequently the focus was changed to increase emphasis in improving the policy, institutional, and regulatory framework of the sector and to encourage private investment. More recently, energy efficiency and the cumulative effects of energy production and consumption on the environment have received increasing priority.

118. ADB and other development partners, particularly the World Bank, have been in continuous dialogue with DMC governments, at the central and to a lesser extent state levels, to support reforms in the power sector. That dialogue contributed to improvements in sector structure, policies and institutions. TA projects, with a few exceptions, have contributed positively to sector reform and performance improvement.

119. ADB has progressively developed and extended its energy policy and sector operations since the 2000 Review in the changing economic and political context. Since the 2000 Review, ADB has developed (i) a CDM facility (2003), (ii) the Energy Efficiency Initiative (2006) including the Clean Energy Financing Partnership Facility (2007), and (iii) the Carbon Fund (2006). There has also been an increased focus on governance reform in the sector. These revisions and extensions to the policy were appropriate in the changing context and have increased the relevance of ADB's energy sector operations. There has been a shift in the composition of energy projects financed by ADB's public and private sector operations in response to the changing infrastructure needs (Table 3). The policy direction has also been responsive to changing external circumstances. The reduction in public sector lending for hydropower funding and thermal generation reflected (i) initial lack of demand following the Asian financial crisis, and (ii) once the level of demand was restored the increased role of the private sector in generation. The number of independently funded generation facilities supported by ADB has increased markedly since 2000. While efforts to mobilize private sector financing for the energy sector needs to continue, there will remain a need for public sector funded energy infrastructure investment in many countries.

120. Policies to support for sector reform and to increase private sector participation continue to be relevant for most DMCs. However, privatization of the entire electricity sector was envisioned for many countries at the time of the 2000 Review. This has lost some of its relevance in many DMCs perhaps with the exception of Pakistan and the Philippines. Full privatization has had limited success in the region. Stalled privatization (e.g., Indonesia, Republic of Korea, the Philippines, Singapore, and Thailand) and strong resistance to privatization (e.g., India, Indonesian Constitutional challenges, and Sri Lanka) indicate that the overall aim of full privatization may no longer be relevant as a matter of policy. Rather, privatization may perhaps better be viewed as one of the possible means to attain a higher level of sector governance. Further, many of the DMCs have large unmet social obligations, such as

rural electrification programs which are not commercially profitable in the short or medium term but which are needed to improve people's lives and help to address various dimensions of poverty. It is unlikely that market based private operators would focus on rural electrification without public sector support.

121. The relevance of the policy goals varies from country to country, depending on the stage of development of the power sector. For instance, India became the largest ADB borrower for energy sector development in the period 2001-2006 (28% of total energy lending) followed by Bangladesh (17%). Countries like Malaysia and Thailand had, in the 1980s and early 1990s, borrowed significant amounts for their power sectors have now developed to the level where ADB funds are no longer needed. The level of energy related assistance from ADB and other funding agencies will likely continue to be low for the DMCs with well developed financial markets and commercially oriented, financially sound power sectors that have successfully implemented sector reforms that created an enabling environment for private investment. Some DMCs continue to have inadequate energy infrastructure and low technical and financial capacities. These countries will continue to require access to public sector financing for power sector development and capacity building before they become self sustaining. However, the number of such countries is diminishing as reform of the power sector proceeds in the Asia Pacific Region. Some small ADB loans had a catalytic effect to promote the entry of other donors or the private sector finance. ADB's enduring presence in Bangladesh and the Theun-Hinboun hydropower project in Lao PDR are examples where ADB's presence has catalyzed additional donor or private funds.

2. The External Context: Aid Agencies and NGOs

122. The 2000 Review is congruent with the major energy initiatives and programs of other multi-lateral agencies active in the power sector development (Appendix 9). The ADB energy operational priorities are similar to those of the World Bank in terms of program instruments and operations of its energy business lines. To address poverty reduction, ADB, the World Bank, and the UN organizations placed high priority on improving access of the poor to modern energy services, increasing the affordability of energy and improving the quality of energy supplied to poor households. These agencies also share common desire to support sector restructuring, improve sector governance, and to create an enabling environment for private investment in the energy sector. The donor community has provided assistance to help DMCs formulate energy sector policies that will facilitate and support market reforms, unbundle existing entities to promote competitive environments, improve social services, ensure that energy subsidies are pro-poor, and improve governance.

123. The ADB 2000 Review is congruent with the UN-Energy initiatives. In 2004, the UN-Energy[41] was created to promote coherence in the UN system's multi-disciplinary response to the World Summit on Sustainable Development and other global initiatives. At the 2002 Summit, linkages between energy and poverty reduction were established, and high priority was placed on changing the unsustainable patterns of energy consumption and production. The Johannesburg Plan of Implementation, launched at the summit, underscored the need to work together at all levels to achieve sustainable development goals for energy.

[41] The UN-Energy is comprised of 20 UN agencies that promote coherence in the multi-disciplinary response to the World Summit on Sustainable Development. It serves as a gateway for sharing information, knowledge on best practices on energy development, and promotes joint programming, harmonization and cooperation in energy-related activities of the UN organizations. It also promotes the effective engagement of non-UN stakeholders in implementing World Summit on Sustainable Development energy-related decisions. The World Bank is an active member of the UN-Energy.

124. The energy policies of ADB and the Japan Bank for International Cooperation (JBIC) diverge on issues such as private sector involvement, governance, regional cooperation and the strategy to promote public sector financing of generation. The JBIC policy does not cover these issues. However, on other policy issues there is a high level of congruence between the two institutions. Other donor agencies such as the Australian Agency for International Development, the United States Agency for International Development, the Department for International Development of the United Kingdom, and United Nations Development Program have more specialized functions, but tend to support the general thrust of the ADB policy, but with a narrower focus. In no case did the study identify major conflicting policy objectives between ADB and the other development agencies. The jointly funded assistance modalities and the cooperation between ADB and development agencies support this conclusion.

125. There is, however, some divergence between the ADB policy and the views of NGOs with respect to funding hydropower and coal fired thermal generation plants. ADB has learned some valuable lessons from the NGOs, particularly with respect to CDM, safeguards and monitoring and has incorporated these as energy policy strategies and the design of more recent projects. Nevertheless some differences remain that sometimes generate tensions between ADB and some NGOs.

3. Rating of Relevance and Strategic Positioning

126. The 2000 Review is rated “highly relevant” and is responsive to changing external environment and to the changing needs of the majority of ADB’s client countries. It is sufficiently broad to cover the divergent needs of the Asia Pacific region and supports and complements the objectives of the other multilateral agencies. Some elements of the 2000 Review were rated “highly relevant” (e.g., sector restructuring, increasing the role of the private sector). While the elements of the strategy related to the regional and global environmental impacts were, conceptually “highly relevant”, but considering the limited lending during much of the evaluation period for clean energy, renewable energy and clean development mechanisms the rating was downgraded to “relevant”. New funds that have been mobilized lately have largely addressed the difficulties in operationalizing the strategy. The focus on poverty reduction as a major driver of ADB’s energy sector operations was over-emphasized. While efforts can and should be made to make ADB operations in the energy sector pro-poor when there are opportunities to do so, poverty reduction will not be the major strategic issue driving ADB positioning and project selection in the energy sector. Rather, ADB should recognize the indirect impact of energy on poverty reduction through economic growth and tailor its interventions to address the development needs of the sector, which may vary from country to country. Changing circumstances have diminished the need to include information technology in energy policies.

B. Effectiveness

127. The effectiveness of the 2000 Review is assessed in terms of how the policy influenced ADB’s energy sector operations and by that achieving the underlying policy objectives such as poverty reduction, private sector participation, the regional and global environment and regional cooperation. The 2000 Review’s overarching goal was to develop the energy sector so that it helped to reduce poverty, by promoting private sector participation and regional cooperation and minimizing adverse environmental effects. The policy’s operational strategies to deliver the intended impacts involved in the efficient and effective delivery of TA and lending. In terms of project outcomes, the ADB benchmark for satisfactory outcomes is for 80% of projects to be rated as successful by the Operations Evaluation Department. Evaluation results show that the

energy sector is one of ADB's best performing sectors with 82% of the energy projects rated as successful or highly successful (Appendix 1).[42] The level of success improved over time—78% success rate for energy projects approved during the 1970s and 1980s; 87% for the 1990s. In successful power projects (i) benefits were immediate once the projects were completed, due to existing excess demand; (ii) increased electricity supply facilitated economic growth and contributed to a better quality of life; (iii) financial policy dialogue and tariff reform helped to provide more funding for investment, operation, and maintenance; and (iv) there were strong project management teams in most executing agencies that had learned lessons from previous projects.

1. Poverty Reduction

128. Given the limited impact of poverty considerations in making decisions on whether ADB should select the energy sector as one of its focal areas in particular DMCs, the relatively weak direct relationship between energy level investments and poverty reduction and the limited evidence that poverty considerations drove project selection, the poverty objective of the 2000 Review is rated "partly effective". The poverty dimension of the policy was "relevant" as it was consistent with the external context and ADB's overarching goal. These strategic concerns override the efforts made to make some energy projects more pro-poor and the evaluation evidence of the positive impact of access to electricity on the lives of the rural poor. For most of ADB's energy sector operations the poverty reduction objective was to be indirectly achieved through trickle down effects of economic growth to which the power sector development makes a contribution.

2. Private Sector Participation

129. There is clear evidence that the 2000 Review influenced ADB's private sector operations in the energy sector. Since the 2000 Review, ADB has been involved in the design of a number of the major sector restructurings. Sectoral reforms helped to improve sector governance and the enabling environment for private sector investment. The broad outlines of the 2000 Review have been successfully translated into specific programs tailored to the political economy conditions prevailing in the country.

130. ADB funded projects and programs have had considerable success in supporting the objective of enhancing private sector involvement in the energy sector. The change in the composition of ADB lending is consistent with the objectives of the 2000 Review. The private sector dimensions of the policy are rated "highly relevant" and "highly effective". Overall, promoting private sector participation and principles helped to increase efficiency in the power sector. Capital and operational efficiency provided through private sector participation and independent regulatory control has freed public resources for other interventions. However, progress in restructuring the power sector has been slower and more difficult than anticipated in every country. This suggests that ADB should be engaged in the sector for a decade or more if it wishes to play a major role in supporting sector reform.

131. The more recent sector reform projects (2001—2006) and accompanying TA were rated as successful and the overall level of success is higher than the sector reforms in the period

[42] Operations Evaluation Department database. The corresponding success rated for all ADB projects approved in the 1970s, 1980s and 1990s were 60%, 58% and 64% respectively. The transport sector is the only other sector for which outcomes exceed the 80% benchmark for satisfactory performance.

1996—2000. This indicates that lessons drawn from the previous period and a greater commitment from DMCs have been increasingly effective in delivering the desired reforms.

132. ADB's private sector operations have been material both in terms of helping catalyze industry reforms and public sector lending through TA to improve the enabling environment, and through direct investment that helped reduce financiers' concerns about project risks. Cooperation between ADB's public sector and private sector operations has facilitated private sector investments in the energy sector. ADB's support for private power generation projects increased sharply after 2000 and there was a corresponding decline in public sector lending for generation. ADB supported private sector energy projects have had positive catalytic effect on mobilizing funding. Private sector partners rate ADB's performance as satisfactory and appreciate the value added associated with ADB's involvement. The private sector projects also had positive and sustainable effect on business practices, including (i) world best practice operations, (ii) exemplary safety records, and (iii) good community relations. The 2000 Review is rated "highly relevant" and "highly effective" in achieving private sector participation in energy sector, both at the sector reform/policy level and at the individual transaction level.

3. Regional and Global Environmental Impacts

133. ADB's assistance for energy efficiency for most of the evaluation period was mainly focused on policy dialogue and capacity development. ADB's level of investment in energy efficiency was far below both the potential and the need. Low energy prices, which prevailed during the early part of the evaluation period, and weaknesses in the policy, legal and regulatory frameworks, did not provide the incentives for companies, households or governments to invest in these areas. A similar conclusion applies to ADB efforts to support renewable energy, reduce greenhouse gas emissions from the energy sector and, more broadly to address issues related to global warming and other environmental issues in the energy sector.

134. Overall the energy efficiency and environmental element of the strategy is rated "highly relevant" but its implementation is rated "partly effective", given the low volume of lending in these areas. Consistent with the 2000 Review, ADB has developed new modalities to better position itself to promote energy efficiency, renewable energy, clean development mechanism, and to promote the development of cleaner technologies in order to help address the regional and global environmental impacts. These are new initiatives so it will be several years before evaluation evidence is available to determine how successful these initiates will be. If these mechanisms prove to be effective, it is likely that the volume of ADB's operations addressing the regional and global environmental impacts will increase in the future and that the "partly effective" rating would be upgraded to "effective".

4. Regional Cooperation

135. Regional cooperation has been a continuing objective of ADB in the power sector but, except in GMS where some tangible success in terms of lending and institutional strengthening has been achieved, efforts have been limited or results slow to materialize in South and Central Asia sub-regions. ADB has been effective in ensuring equitable negotiating positions that allow countries to come to agreements and has provided a venue to involve other donors. Institutional development has been complemented by lending to support regional power projects. Overall, ADB's efforts to promote regional cooperation in electricity sector are rated "relevant" and "partly effective," with the good progress in GMS offset by the lack of progress elsewhere (see also para 115).

5. Rating of Effectiveness

136. Based on the foregoing, the 2000 Review is rated as “effective”. Of the 142 energy projects that have been rated, 82% were rated as satisfactory or better. This was one of the best results across all sectors in which ADB operates. The success rate for program loans for energy sector development and reforms was lower at 70%. This reflects the difficulty of planning and implementing sector reforms, a lesson that is common throughout the Asia Pacific Region. Of the four pillars, the policy has successfully influenced sector reform and private sector participation in energy sector. Both ADB’s public and private sector lending operations benefited from this. While there was evidence of being ‘effective’ in regional cooperation in energy sector in GMS, ADB has not yet been effective in doing so in other subregions. In other pillars — poverty reduction, and regional and environmental impacts — while the policy was relevant, but its performance was rated as ‘partly effective’ due to limited results. The evaluation noted that while ADB has recently introduced new initiatives for energy efficiency, renewable energy and the environment, it was too early to assess their outcomes.

C. Efficiency

137. Efficiency in achieving the goals of the 2000 Review was assessed in terms of resource use (in terms of return on investment), input efficiency, and processes including timeliness of outcomes. Energy projects and programs overall have a high success rate in delivering expected outcomes through efficient use of resources.

1. Resource Use

138. The ex-ante and ex-post economic internal rates of return (EIRR) for power projects are compared in Appendix 10. All types of power projects (e.g., thermal and hydro generation; transmission; distribution) have performed well. The ex-post EIRRs estimated at the time of evaluation were lower than the estimates at the time of project approval for 61% of thermal energy generation and half of transmission and distribution projects. Hydropower projects performed better in terms of this criterion—EIRRs for half of hydropower projects reestimated in the project performance audit reports exceeded the initial estimates. Reasons for the divergence between ex-ante and ex-post EIRR estimates include (i) less than expected tariff increases, (ii) higher than expected operating costs, (iii) lower than expected demand, and (iv) delays in implementation. Despite being lower than expected, 51 of the 68 evaluated power projects (75%)[43] achieved EIRRs at evaluation that were greater than or equal to the 12% benchmark. Despite the lower ex-post EIRRs, evaluation results indicate that a clear majority of the projects was economically justified the projects represented an efficient use of capital and that the benefits generated are likely to be sustained.

139. Information is not available to compare the financial internal rates of return (FIRRs) with the average weighted cost of capital for all projects. In 73% of the power projects evaluated, the ex-post FIRRs were lower than the ex-ante estimates (Appendix 10). Lower FIRRs occurred in 75% of transmission and distribution projects, 88% of hydropower projects, and 62% of thermal projects. Reasons for this include overoptimistic sales projections, failure to adjust tariffs to the required levels, cost overruns, and implementation delays. For hydropower projects, lower than expected power generation was sometimes due to less-than-expected water flow.

[43] 78% of thermal projects; 77% of transmission and distribution projects, and 64% of hydropower projects.

2. Input Efficiency

140. There has generally been a good match between program, project and TA designs and capabilities of the executing agencies. Most executing agencies in the energy sector have had previous experience with ADB's loan requirements and have highly qualified project management teams which can draw on significant internal technical expertise. This high level of technical and project management skills were instrumental in the design, implementation and subsequent operations of the generally successful project outcomes.

141. Project designs have benefited from incorporating the lessons from earlier projects. Lessons learned from previous hydropower projects were incorporated into subsequent designs, and funding for environmental and social mitigation measures was identified upfront as separate line items of the loan. Power purchase agreements supported by ADB funding promoted a more equitable sharing of risks between the individual power producer and the offtaker. The increased extensive due diligence of external risks of private sector projects has increased the potential for successful projects.

142. While the energy projects were generally successful, the evaluation noted that project designs often did not clearly set out all options, and least cost outcomes described in project documents were rarely justified. Alternative approaches were not fully analyzed. Capacity additions were not assessed together with energy efficiency initiatives that have the potential to avoid or reduce the additional capacity.

3. Processes

143. A consultative approach and strong client ownership were key ingredients of successful projects. For many projects there was a comprehensive policy dialogue with the executing agencies which helped to ensure that the ADB supported initiatives were relevant, appropriate to sector needs and matched the capabilities of the executing agencies. Where knowledge was limited, the project designs were more extensive, supported by TA projects for both project preparatory and capacity building to address institutional weaknesses. A key to success was the fact that ADB was involved in the sector in most countries over many years and became a trusted adviser to the executing agencies. In some cases there was a considerable period of time before lending commenced. Initial lending was generally preceded by extensive policy dialogue which was used to develop clear road maps and consensus by ADB and the government for the expected outcomes of the assistance.

144. Lack of compliance with financial covenants continues to be problematic for many energy projects, leading to lower than expected financial returns. Compliance with covenants, particularly financial covenants and the timing of deliverables such as audited accounts, have often been delayed. Executing agencies undergoing restructuring indicated that the process itself was often delayed by the sector reform. Hence, the timetables set out in the legal documents were often unrealistic. A more flexible approach, to interpret the spirit of the covenants rather than imposing "the letter of the law" was suggested by several executing agencies interviewed during the evaluation (Appendix 11). Some executing agencies criticized ADB's policies and procedures and some unrealistic timeframes for compliance with covenants.

145. The views of some DMCs on ADB's safeguard policies were reported in recent OED reports that are inputs into the ongoing safeguard policies updates. Similar feedback was received from several key clients during the preparation of this evaluation. Some believed that the transaction costs of ADB environmental and resettlement safeguard procedures were high

relative to both the benefits and DMCs' capabilities to bear the cost. In many cases, executing agencies have to comply with both national and ADB procedures, causing a duplication of effort. However, there is considerable effort now to harmonize safeguards in the region which should lead to lowered procedural costs.

146. The evaluation noted two different experiences with ICB. In some cases ICB resulted in considerable savings (Madhya Pradesh, $56 million). But in other instances the use of ICB was alleged to have increased costs as the EAs were prevented from negotiating after bid closure or costs were actually increased. ADB approval procedures were criticized by some EAs as incurring additional costs and not being suited to local conditions. For instance, the disbursement process of ADB was described as time consuming and complicated. One EA raised concerns regarding the process of ICB, where a local supplier had to use an intermediary to meet ICB requirements. Subsequently, the delivered price was higher than if the item was procured locally due to additional commissions of the intermediary.

4. Rating of Efficiency

147. Based on the foregoing, the 2000 Review is thus rated "efficient", but there is scope for improvement.

D. Sustainability

148. Sustainability may be viewed as lasting influence in achieving long term development results. ADB's energy portfolio has had a history of high levels of successful outcomes. The sustainability of ADB's 2000 Review will depend on (i) demonstrating positive effects of the policy and replicating these effects; (ii) meeting the changing needs of clients; and (iii) having the necessary staff skills so that ADB provides value added services and financing to support the development of the energy sector. The likelihood of the sustainability of the 2000 Review and its continued success in delivering intended outputs and outcomes is assessed by looking at these three indicators.

1. Demonstration and Replication Effects

149. The demonstration effects observed in India and Bangladesh (sector restructuring and regulatory development), the PRC (energy efficiency and environmental improvement), India (renewable energy), and in regional cooperation (Cambodia, Lao PDR, the PRC, , Viet Nam) suggest that ADB is providing replicable outcomes for successful development of energy infrastructure, capacity building and the development of energy efficiency. The 2000 Review emphasized private sector participation. The sharp increase in ADB supported private sector energy transactions, supported by the policy dialogue and sector restructuring undertaken by the public side of ADB, was successful in mobilizing private sector capital and demonstrated the viability of this approach.

2. Meeting the Needs of Clients

150. The disparity of access to electricity and incomes across the Asia and Pacific region suggests that ADB will have a continuing role in providing assistance for a broad range of requirements in the energy sector, covering infrastructure expansion and upgrades, technical and financial management of the sector, and encouraging the efficient use of capital. ADB assistance will continue to be required to support sector reforms, and private sector participation in the more developed countries and for publicly owned power sector infrastructure and

improved operations and maintenance in the less developed countries. Although ADB has achieved significant success in promoting sector reforms, increased private sector investment and improving energy infrastructure, there has been little demand for its products for energy efficiency, clean energy and renewable energy. The new funds included under the umbrella of ADB's Clean Energy and Environment Program should help to make those elements of the energy policy more sustainable. As long as ADB's energy policy is sufficiently flexible to meet the diverse needs of its clients in the Asia Pacific region, it will continue to remain relevant and sustainable.

151. As energy sectors develop and become more financially independent and as domestic financial markets deepen, they require less support from ADB. This is a natural progression. The aim for the energy sector in the more developed DMCs would be to make the energy sectors self-sustaining and for ADB to gradually exit the public lending while expanding its private sector operations. In other countries access to international capital markets and private sector investment will be limited and there will be a continuing role for public sector assistance from ADB. There is also a continuing need for specialized advice for policy, legal and regulatory development, institutional capacity building and technology. The demand for lending for energy efficiency, renewable energy and to address environmental issues should grow, if oil and coal prices remain high and the enabling framework improves. Sustainability of lending will be affected by the ability of both the public and private sector loans of ADB to compete with other sources of financing and respond to DMC needs. Overall, the evaluation concludes that the policy has been both responsive to client needs and to the changes in the external environment (Appendix 12).

3. ADB Staff Skills

152. ADB staff dealing with the energy sector must have a broad range of skills to deal with the wide ranging requirements of the energy sector in the Asia Pacific region. Staff have also shown their capacity to develop new initiatives to support the changing external context. The continued sustainability of ADB's operations in the energy sector will depend on successfully matching the staff skills mix with client expectations. ADB is a service organization, and its success depends, in part, on the quality, skills mix, and motivation of staff. The 2002 report of the Independent Assessment Panel on the Effectiveness of the Bank's Reorganization[44] concluded that ADB had lost technical expertise and recommended that ADB should increase the number of technical specialists by 50. During consultations with some of ADB's largest clients (e.g., India, Indonesia, Pakistan, the PRC, and the Philippines) for the *Middle Income Country related issues,* comments were made that some ADB mission leaders lacked technical skills and experience. Some DMCs have moved past a requirement for ADB to provide simple operational technical advice, as they have developed that capacity. Sometimes ADB missions have lacked the skill and experience to provide the value added that is sought by clients.

153. The energy sector is identified as a Group I sector in ADB's second medium term strategy, which indicates that ADB's operations in this area are expected to grow. With project pipelines in the next three years of $3 to $4 billion annually, there is a sustained demand for assistance in the energy sector. A survey of energy specialists conducted by RSDD found that the self ratings of competencies indicate that energy staff have a moderate to high level of expertise in the traditional supply technologies (Appendix 13). However, skills in areas such as procurement, corporate governance, renewable energy and financial management were more limited. Going forward, operations will require more staff with expertise in procurement

[44] See para. 61 of the Independent Assessment Panel on the Effectiveness of the Bank's Reorganization report.

governance and financial management in the energy sector. This may require some changes to ADB's staffing skills mix.

4. Rating of Sustainability

154. The 2000 Review is rated "highly sustainable" in the medium term. This rating reflects the strong future pipeline of energy projects (i.e., demand from ADB's clients), the value added in terms of demonstration and replicability, and ADB's commitment to the sector as indicated in its second medium term strategy.

E. Overall Assessment

155. Overall the 2000 Energy Policy is rated "successful" based on an assessment of being relevant, bordering on highly relevant, effective, efficient and highly likely to be sustainable (see Table 7).

Table 7: Overall Rating of ADB's Energy Policy 2000 Review

	Weighting	Rating	Weighted Rating
Relevance	0.20	2.60	0.52
Effectiveness	0.30	2.20	0.66
Efficiency	0.30	2.00	0.60
Sustainability	0.20	2.70	0.54
Overall Rating			**2.22**

Rating scale where R = rating: highly successful when $R > 2.7$, successful when $1.6 \leq R < 2.7$, partly successful when $0.8 \leq R < 1.6$, and unsuccessful when $R < 0.8$.
Source: Special evaluation study ratings

V. CONCLUSIONS, ISSUES, LESSONS AND RECOMMENDATIONS

A. Conclusions

156. The shift in strategy, since the 2000 Review and the resulting greater focus on sector reform was complemented by coordination between multilateral agencies, with common agreed themes for sector restructuring and to avoid duplication of efforts. Overlapping assistance was not observed in ADB projects and reflects good coordination between countries, ADB and other donors. In terms of outcomes, the energy sector is one of ADB's best performing sectors. Both loan and TA ratings exceeded ADB's benchmark of satisfactory performance. Operations were generally designed to be consistent with the capacity of the executing agencies to absorb the assistance. There was limited success in making significant volumes of lending to address problems related to the energy sector and the environment. However, new instruments have been developed that should allow ADB to play a greater role in areas related to energy efficiency, renewable energy, greenhouse gas emissions and clean technologies.

157. Power sector reform, including promoting private sector participation, needs to be based on a clear government commitment before ADB provides support through a mix of program, project and TA support. Sector reform can work well when there has been a common commitment from all concerned parties. The electrification ratio has increased in the Asia Pacific

Region and progress has been made in extending electrification to consumers including those living in rural areas, reducing subsidies and reducing losses through theft. As the energy sector in the Asia Pacific region develops, becomes more financially self sufficient and private sector investment increases, there will be less demand for traditional public sector lending in the power sector, particularly for generation.

158. The major impacts of ADB assistance include (i) financial and tariff restructuring and lower costs have reduced the need for subsidies and less public sector funds for the power sector; (ii) the increased quality of energy supply has increased the reliability of the supply, a major attraction to industries which are heavily reliant on secure supplies; (iii) the demonstration effects of energy efficiency and renewable energy projects provide tangible evidence that some of these sub-sectors can be self sustaining; (iv) some energy projects have had positive and immediate impacts on improving environmental conditions; and (v) governance at the sector level is improving in the power industry but corruption remains a problem; and (vi) the transfer of skills gained from TA in areas such as developing tariffs, automated billing, and management reporting systems have improved the quality and timeliness of management decisions.

B. Lessons Identified

159. The key lessons are (i) sector reform and independent regulation are providing tangible impacts but efficiency gains during implementation can lead to further improvements; and (ii) energy efficient, renewable energy and clean energy programs are in their infancy, with a substantial need and potential to increase.

1. Promoting Sector Reform Is Providing Tangible Results

160. ADB's efforts to support private sector investment in the energy sector have largely been successful as a result of well targeted assistance and synergies between the public and private sector sides of ADB. The following lessons were identified:

(i) Due diligence for large energy projects should include a comprehensive supply side evaluation and full scale technical systems simulations. This will alert the project sponsors to competitive and other supply side risks at time of project appraisal.
(ii) Legal risks associated with private sector power projects are substantial. The enforceability of even well drafted legal agreements can be difficult, particularly when there is limited contractual legal experience for energy offtaker agreements in a DMC.
(iii) Open and transparent bidding processes for capacity additions lead to the lowest cost energy supply with an equitable allocation of risks and rewards between the Independent Power Producer and offtaker. ADB should be cautious of becoming involved in a project for which the franchise is awarded as the result of a non-transparent, negotiated process.
(iv) ADB should be more assertive in the application of its environmental safeguard policies to private sector operations in the energy sector.[45]

161. ADB assistance helped to improve the financial performance of some power sector organizations (e.g., Bangladesh, India, Indonesia, Pakistan, and the Philippines). While complete privatization of the power was the ultimate aim of the 1995 Energy Policy and the

[45] The ability of the Private Sector Operations Department to do so was strengthened in 2006.

2000 Review, the outcomes from successful projects in the public sector indicate that the efficiency gains and improved transparency from better governance, which were thought to only be attainable through the private sector, can also be achieved by public sector companies if commercially and financially sustainable management principles are followed.

162. The following general lessons were common to the program loans examined during the evaluation.

(i) The restructuring process involves considerable change in the balance of power in the power sector.
(ii) Authority is transferred from ministers and civil servants to regulators, customers and privately owned or commercially managed public companies.
(iii) Large centralized utilities are broken up.
(iv) Top managers in those utilities are generally unhappy with the loss of status and/or jobs.
(v) Some of ADB's loan covenants were overly ambitious with respect to the speed of implementation of reforms.
(vi) Sector reform programs need to recognize the political economy issues associated with restructuring programs and to develop strategies to address the concerns of those who might not support such reforms. This will not necessarily shorten the implementation period, but their inclusion in project designs is likely to result in more realistic timeframes.

163. ADB has had sustained involvement in the power sectors of many countries in which it operates. As a result it has a detailed understanding of local policies and priorities and the key institutions and decision makers in the power sector. Sustained engagement which results in ADB being perceived as a trusted adviser, allows ADB to help keep sector reforms on track and, on occasion help to put them back on track. Although there have been problems related to power sector reforms in the Philippines, Bangladesh and Pakistan, ADB has persevered with support for the reform efforts. It is unlikely that the same results would be obtained with an approach which involved ADB moving in and out of the sectors depending on their short term performance.

164. Introducing independent regulation is a key part of the power sector restructuring process. Power sector regulation has played a significant role in promoting reform and subsequently has led to better performance and commercial autonomy in the energy sector. Progress has been made by regulators in most DMCs in improving transparency through web sites and other public information mechanisms. The early appointment of regulators, together with formulating enabling regulations, (e.g., India, Pakistan and the Philippines) has resulted in a smoother transition to a commercial environment that in those countries where the regulatory process is underdeveloped (e.g., Bangladesh and Sri Lanka). Better regulation is a necessary, but not sufficient condition for a more efficient and effective power sector. It must be complemented with better sector governance.

165. ADB has imposed a number of financial covenants on power utilities and governments as part of its lending operations. Utilities are required to submit audited accounts by a deadline and to achieve other financial objectives related to the management of customer receivables and their overall financial performance. However, there have been many examples of utilities failing to meet these objectives; lack of compliance with financial covenants (18% non compliant; 14% partially compliant) continue to be a concern. There is a significant problem with compliance with financial covenants (Appendix 11).

166. The distribution sector is the most vulnerable sector to political intervention, particularly with respect to cost recovery. The conflict between non-profitable sectors supported by subsidies and the need to develop sustainability through cost recovery and efficiencies continues to be a problem for the political economy of developing nations. This discourages private sector participation because of the high perceived risks. The process will continue to be slow and ambitions should be tempered to reflect the political economy realities.

167. The 2000 Review recommended assistance in risk management of "regional projects that involve private sector participation". Risk management in the trading of electricity and fuel has been noticeably absent in the DMC electricity organizations. Electricity trading is a volatile market and trading involves considerable risks. These include financial, operational, and counterparty risks at the corporate level and prudential and regulatory risks at the market level.

168. In emerging markets, risk management is an essential requirement for the long term survival of all participants. This requires the training of skilled professionals. Risk management features, both their design and implementation, were absent in all of the restructuring plans reviewed during the evaluation. When a market has many small participants, such as the electricity cooperatives in the Philippines, the costs of transactions and the requirements for risk management may be beyond the financial capabilities of the participants. In India, collective trading through holding companies reallocates the risks between the distribution companies circumventing the need to shift the risk away from consumers.

169. Fuel management is also an area where risk management, including hedging supplies and managing stockpiles was not being implemented. This exposed utilities in Sri Lanka and Philippines where the utilities pay spot prices for fuel. The price increases were not fully passed on to consumers, and thus the utilities rapidly turned from being profitable to net negative cash flow organizations when fuels costs increased rapidly. The most severely affected projects involved diesel generation (e. g., Sri Lanka and the Philippines).

2. Energy Efficiency

170. The major challenge in developing demand side energy efficiency initiatives will be to reduce the transaction costs[46] which are an inherent part of the process. There are considerable barriers to firms and households investing in energy efficiency and even projects with 2 or 3 year payback periods are not being implemented. Traditional ADB lending is not suitable for these small-sized projects and ADB staff have been discouraged to design environment and energy efficiency projects for state owned enterprises. There is significant scope to improve energy efficiency and reduce emissions in the industrial sector, particularly enterprises, often publicly owned, that employ outdated technology.

171. Demand side management (e. g., new technologies; better regulation; adjusting the level tariffs and introducing TOU tariffs; encouraging the development of energy service companies; consumer education and public advocacy) can contribute substantially to meeting the objectives of ADB's energy policy. However, it has received limited operational attention. In general, power retailers are conservative with their tariff structures and have made few innovations. This is in spite of significant peaks in system demand, usually in the early evening. To meet this peak demand, expensive peaking power infrastructure is constructed. A cheaper alternative is to use

[46] The lack of success in a project in India reflects the large transaction costs incurred by the on-lender in setting up the loans for third parties, and the subsequent ready availability of less expensive funds.

market based price signals to provide incentives to shift demand to off peak hours, i.e., charge more for electricity used during the peak hours. Recent technological developments in metering and computerized billing make complex tariff structures relatively straightforward to implement. Evaluation findings indicate that TOU tariffs can be effective in shifting peak loads. A number of utilities have undertaken tariff studies, often financed through TA that examined TOU tariffs, but have made little or no use of the results. There are a number of reasons for this:

(i) A "predict and provide mentality" in staff at utilities who do not view using tariffs to reduce peak demand as an element of supply strategy.
(ii) A tendency to focus on tariffs as a cost recovery tool rather than an instrument of demand management.
(iii) The legacy of administered monopolies that result in power retailers maintaining the same tariffs, which discourages tariff experiments and price competition.
(iv) Regulatory processes for tariff approvals, which encourage retailers to seek across the board increases or tariff increases that are perceived to be politically acceptable rather than considering structural innovations.

C. Issues

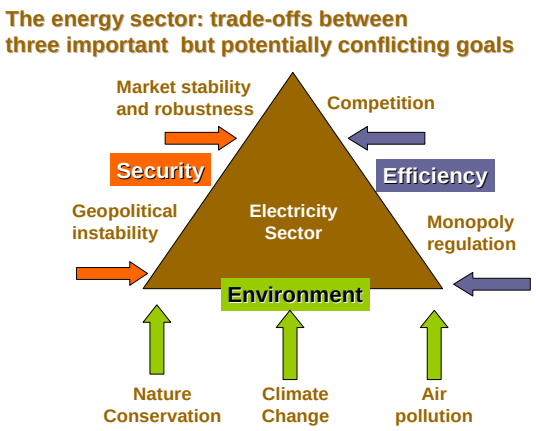
1. Energy Environment Nexus

172. The major issue for the Asia Pacific region will be to successfully manage the nexus between environment and energy sector so that the expected continued rapid economic growth will be environmentally sustainable. There are many inherent conflicts and issues in developing infrastructure for the energy sector (see Figure 3). For example (i) energy security and diversity may not be the most cost effective solution in the short term; (ii) measures to stabilize the effects of greenhouse gas are expensive, estimated to cost 1% of GDP (footnote 9); (iii) renewable energy projects are often not commercially viable; (iv) renewable energy cannot provide significant amounts of power to supply all markets in the short to medium term; (v) hydropower projects sometimes have adverse impacts on the river basin environment and affected people; (vi) thermal power, while inexpensive, externalizes environmental costs and contributes to the emission of pollutants and greenhouse gas; and (vii) while nuclear energy has no emissions, it has the potential to be very dangerous if there is a technical problem and waste disposal is still contentious. Energy markets do not always function in ways which achieve an appropriate balance between these conflicts as many of them cannot be addressed by the power of competitive markets.

173. The new instruments developed under ADB's Clean Energy and Environment Initiative should position ADB to help address the energy environment nexus in the future. However, to effectively do so, the lessons of the evaluation suggest that these initiatives need to be complemented by more activities in three areas; (i) policy dialogue to improve enabling environment for the energy sector; (ii) reflecting environment costs and benefits in economic analysis of power projects; and (iii) use of strategic environmental assessment (see Appendix 14).[47]

[47] Evaluation Cooperation Group. 2007. The Nexus between Infrastructure and Environment, a joint paper by Evaluation Cooperation Group and the International Financial Institutions including Asian Development Bank.

Figure 3: Conflicts in the Energy Sector



Source: Operations Evaluation Department.

174. There is a debate about the effectiveness of emission trading. Current emissions-trading schemes have allowed greenhouse gas emitters in the OECD to shift the burden of making greenhouse gas cuts onto the developing world. Most European governments were overgenerous in allocating targets to specific industries hence anticipated reductions are not being achieved, and the price of carbon credits have collapsed.[48] The Kyoto Agreement covers only about 30% of world greenhouse gas emissions. Going forward, this coverage must be expanded for the cap and trade approach to be successful in managing greenhouse gas emissions. There are also concerns that emissions trading may be diverting investment from renewable-energy technology. Recent work[49] suggests that the global cost of emissions (e.g., carbon tax or tradable emissions permit price) should be close to the economic incentive to stabilize global emissions. These concerns warrant further debate and research on the merits of alternative schemes to control greenhouse gas emissions such as carbon taxes. Given the scope of the problem, many complementary approaches will need to be developed to address the problem of emissions and air pollution associated with the energy sector.

175. It can be expected that cost reductions in renewable energy capital equipment through recent economies of scale and transfer of manufacturing to the PRC, together with sustained higher energy prices and a greater awareness of the costs of greenhouse gas emissions, will make renewable energy and clean energy initiatives more financially viable. However, the relatively inexpensive cost of coal fired plant of around 4—5 cents per kWh, the availability of inexpensive, but low efficiency, coal-fired generation manufacturing capacity in the PRC when compared to some of the more expensive renewable technology (e.g., solar power at $2.00 per kWh) remain steep barriers to overcome.

176. Some international NGOs lobby strongly against hydropower and coal-fired projects. Reports[50] prepared by NGOs on dams identified many issues that are similar to OED findings. Several conclusions emerge about the application of safeguards to dams: (i) future ADB

[48] CantorCO_2 (UK Ltd). 2007. See also, for instance: 2007 Newsweek, 12 March. *Carbon Folly.*
[49] Center for Global Development. 2007. *Close Enough: Let's Price Carbon Emissions*. Washington, DC.
[50] NGO Forum. 2000. *Thee Asian Development Bank and Dams*. Philippines, 2000. *The Report of the World Commission on Dams.* London.

involvement in projects with dams will be controversial;[51] (ii) ADB will need to make special efforts to apply its safeguard policies during project preparation, implementation and operations; (iii) ADB needs to find a more constructive way to work with NGOs and affected people to ensure that the hydropower and coal-fired projects that it funds do not harm people and the environment. If ADB became involved in coal-fired projects steps must be taken to ensure such projects meet best practice emission standards and that they use cleaner technology.

2. Other Issues

177. There are small island countries where alternative energy sources are either costly or simply not available (e.g., Pacific DMCs). In the Pacific DMCs, energy efficiency, environment sustainability and economic growth are particularly important where the cost of energy supply is extremely expensive. They are also disproportionately affected by climate change and by international oil prices as they rely heavily on diesel fired generation. In some countries fuel imports account for more than 10-20% of their gross domestic product and up to 250% of the total merchandize exports. While development of renewable resources is identified as a key aim of polices for the energy sector, ADB faces key real constraints in these areas as there are limited opportunities to diversify energy sources. Key problems in this regard include tribal land issues, hydropower resources are limited, wind power is practically difficult to use (typhoons or minimal wind), solar power and bio fuel are uneconomical. There are also small landlocked countries which depend heavily on harnessing their hydropower resources (e.g. Bhutan, Lao PDR, Nepal, and Tajikistan) for their export revenues. These may have the potential to disturb water flows in neighboring countries and cross border issues are likely to arise.

D. Recommendations

178. This section focuses on the areas of the energy policy which need continuation and the new areas which need considering for inclusion in the new policy or strategy that will be prepared for the future ADB operations. Appendix 14 provides further details on strategic priorities and ensuing recommendations.

179. The evaluation of ADB's Energy Policy was a challenge because, like all other ADB policies formulated during this period, neither the 1995 Energy Policy nor the 2000 Review was accompanied by a design and monitoring framework that set out clear objectives and indicators against which progress could be assessed. With this caveat, the evaluation findings indicate that, while the principles and objectives of the 2000 Review generally remain valid and relevant, the policy and strategies should be updated to better reflect current needs and resources within DMCs and ADB. This would include a consolidation of the new initiatives and strategies embodied in ADB's Clean Energy and Environment Program. The four pillars of ADB's 2000 Review emphasize different aspects of setting investment priorities. However, linkages between the four pillars are not clearly set out. Few if any projects will contribute to all four of these pillars. There were no clear criteria which can be used to set priorities between the four objectives.

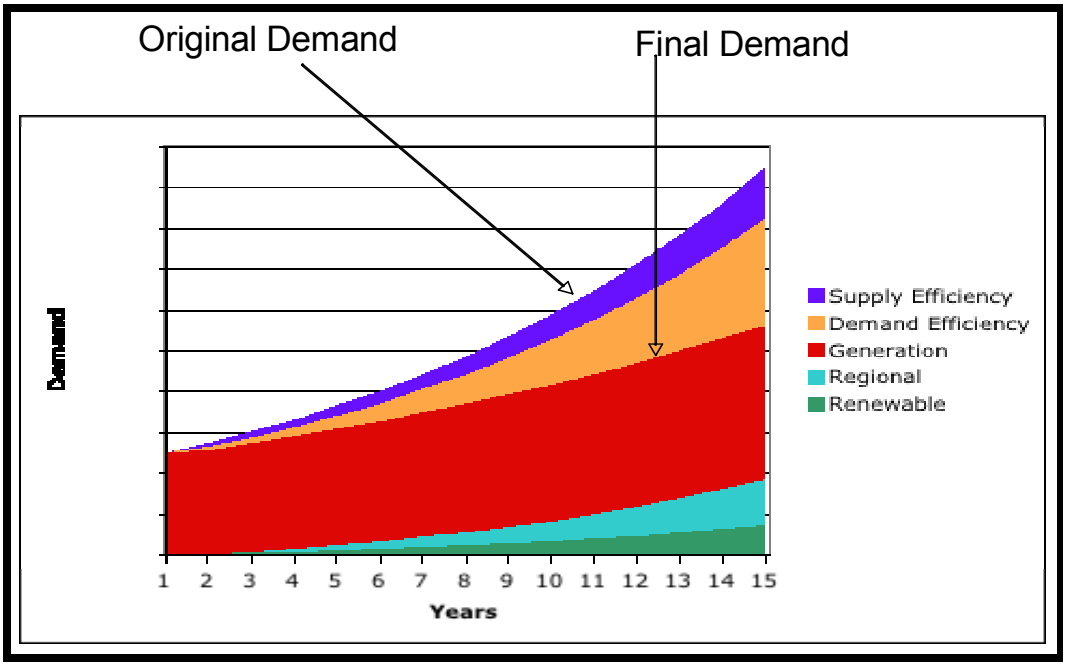
180. Assuming that energy efficiency initiatives are effective, significant amounts of new generation capacity will still be needed to meet the growing demand for energy and the lights do not go out. The International Energy Agency estimates that there will be requirement in the Asia

[51] Greenpeace International and EREC. 2007. *Energy [R]Evolution: A Sustainable World Energy Outlook.* Greenpeace criticizes ADB for supporting large hydro-electric power plants and promotes smaller 'run-of-the-river hydropower that is said to be more environment-friendly.

Pacific region for an additional 2,669 MW of generation to supply energy needs to 2030.[52] There are also countries which may have limited alternatives for energy supply. The results of the evaluation suggest that ADB's support for the energy sector should be driven by two key policy considerations (i) energy efficiency, and (ii) good governance. The objective should be to achieve a future in which an increasing portion of the Asia Pacific region's growing need for energy is met by improvements in energy efficiency and energy technologies that minimize adverse impacts on the environment. A schematic representation of a business as usual approach and an approach that embodies these principles is shown in Figure 4.

181. Implementation of the above initiatives will be time consuming, as they involve significant organizational and regulatory changes. Hence, realistic targets for implementation should be set. There is also a large difference in underlying capacity among DMCs. Capacity building should precede loans; policy and organizational changes, regulations, and widespread acceptance of the benefits need to be cultivated through policy dialogue and public awareness. This indicates that large-scale visible changes related to energy efficiency initiatives will be slow to materialize.

Figure 4: Original (business as usual) vs Energy Efficient Outcome



Source: Special Evaluation Study, Operations Evaluation Department.

182. The 2007 review should update and fine tune the existing policy (1995, 2000) for more effective implementation in the medium to long term. The ensuing updated strategy should achieve the following outcomes:

(i) Improve efficiencies across the energy chain to minimize investment in new generating capacity to meet the growing demand for energy.
(ii) Reflect environmental externalities in decision making in the energy sector.

[52] International Energy Agency. 2006. *World Energy Outlook 2006*.

(iii) Pricing and resource allocation decisions take place under market forces under an effective and credible regulatory oversight.
(iv) Subsidies transparent and targeted.
(v) Policies rely on market based incentives to promote efficiency and environmentally friendly behavior.
(vi) Sector governance is improved to increase efficiency, create opportunities for private sector participation and reduce opportunities for corruption, and
(vii) ADB becomes a more client focused institution.

183. The following areas of the energy policy are recommended for continuation with stronger client focus and more operational vigor: (i) private sector participation including unbundling, restructuring and privatization with improved corporate governance; (ii) mitigation of environmental impacts through cleaner technologies; and (iii) regional economic cooperation in energy sector, considering also cross-border environmental implications.

184. In addition, the following directional recommendations are put forward for consideration by Management and also for incorporation in the ongoing review of the energy policy and strategy formulation by the Regional and Sustainable Development Department.

Key Recommendations	Responsibility	Timing
1. Manage the Energy/Environment Nexus: (i) Make improving energy efficiency the single highest priority in the ADB's new energy strategy so that all feasible efforts are made to decrease demand through viable energy efficiency initiatives and increases in system efficiencies before investing in new energy generation capacity. (ii) Complement these initiatives with (a) ADB becoming known as a center for excellence to improve the policy, legal and regulatory framework and the use of market based incentives to improve the enabling framework for energy efficiency, renewable energy and ways to address environmental concerns in the energy sector; (b) incorporating, as a matter of routine, environmental costs and benefits in the economic analysis undertaken for energy projects; and (c) undertaking strategic environmental assessments for the energy sector in those countries in which the country partnership strategy envisions a significant role for ADB in the energy sector.	RSDD and RDs	2007 and ongoing

2. **Improve Sector Governance:** Supplement ongoing efforts to improve governance by providing staff with more guidance on how to address governance issues to reduce opportunities for corruption in the energy sector.	OAG, RDs, and RSDD	2008 and ongoing
3. **Develop an Implementation Plan for the new energy strategy that:** (i) reconciles the policy and strategic aspirations with organizational, budget, and human resources implications; and (ii) includes a results framework with monitorable key indicators (for inputs, outputs and short and long term outcomes/results) so that implementation progress can be monitored and, if necessary, midterm corrections can be made.	RDs, RSDD, SPD, and BPMSD	2008 and ongoing

ADB = Asian Development Bank, BPMSD = Budget Personnel Management System Department, OAG = Office of the Auditor General, RDs = Regional Departments, RSDD = Regional and Sustainable Development Department, SPD = Strategy and Policy Department.
Source: Special Evaluation Study.

LOANS AND TECHNICAL ASSISTANCE IN THE ENERGY SECTOR

Table A1.1: Public Sector Loans in the Energy Sector

	1996—2000			2001—2006			TOTAL		
	No.	$ million	%	No.	$ million	%	No.	$ million	%
Afghanistan	0	0.0	0.0	2	61.5	1.3	2	61.5	0.7
Bangladesh	3	291.4	7.1	8	787.5	16.9	11	1,078.9	12.3
Bhutan	1	10.0	0.2	1	9.4	0.2	2	19.4	0.2
Cambodia	1	18.6	0.5	2	64.3	1.4	3	82.9	1.0
PRC	7	746.0	18.3	7	608.4	13.0	14	1,354.4	15.5
India	5	850.0	20.8	7	1,225.0	26.2	12	2,075.0	23.7
Indonesia	2	400.0	9.8	3	376.0	8.0	5	776.0	8.9
Kyrgyz Republic	1	30.0	0.7	0	0.0	0.0	1	30.0	0.3
Lao PDR	2	82.0	2.0	2	50.0	1.1	4	132.0	1.5
Maldives	1	7.0	0.2	1	8.0	0.2	2	15.0	0.2
Mongolia	2	50.0	1.2	0	0.0	0.0	2	50.0	0.6
Nepal	2	210.0	5.1	0	0.0	0.0	2	210.0	2.4
Pakistan	4	655.0	16.0	4	351.0	7.5	8	1,006.0	11.5
Philippines	3	496.8	12.2	2	490.0	10.5	5	986.7	11.3
Samoa	0	0.0	0.0	1	6.0	0.1	1	6.0	0.1
Sri Lanka	0	0.0	0.0	2	130.0	2.8	2	130.0	1.5
Tajikistan	1	34.0	0.8	1	21.5	0.5	2	55.5	0.6
Thailand	1	100.0	2.5	0	0.0	0.0	1	100.0	1.1
Tonga	1	4.9	0.1	0	0.0	0.0	1	4.9	0.1
Viet Nam	1	100.0	2.5	2	480.0	10.3	3	580.0	6.6
TOTAL	**38**	**4,085.6**	**100.0**	**45**	**4,668.6**	**100.0**	**83**	**8,754.2**	**100.0**

Lao PDR = Lao People's Democratic Republic, No. = number, PRC = People's Republic of China.
Source: Asian Development Bank database.

Table A1.2: Conventional Energy Generation Loans
(other than hydropower)

	1996—2000			2001—2006			TOTAL		
	No.	$ million	%	No.	$ million	%	No.	$ million	%
Bangladesh	0	0.0	0.0	2	72.6	49.2	2	72.6	24.2
PRC	1	2.0	1.3	0	0.0	0.0	1	2.0	0.7
India	1	150.0	98.7	1	75.0	50.8	2	225.0	75.1
TOTAL	**2**	**152.0**	**100.0**	**3**	**147.6**	**100.0**	**5**	**299.6**	**100.0**

No. = Number, PRC = People's Republic of China.
Source: Asian Development Bank database.

Table A1.3: Energy Sector Development Loans

	1996—2000			2001—2006			TOTAL		
	No.	$ million	%	No.	$ million	%	No.	$ million	%
Bangladesh	0	0.0	0.0	2	230.0	10.8	2	230.0	6.3
PRC	3	436.0	29.1	4	451.4	21.1	7	887.4	24.4
India	0	0.0	0.0	5	750.0	35.1	5	750.0	20.7
Indonesia	2	400.0	26.7	0	0.0	0.0	2	400.0	11.0
Maldives	0	0.0	0.0	1	8.0	0.4	1	8.0	0.2
Pakistan	3	355.0	23.7	2	115.0	5.4	5	470.0	12.9
Philippines	1	300.0	20.1	1	450.0	21.1	2	750.0	20.7
Sri Lanka	0	0.0	0.0	2	130.0	6.1	2	130.0	3.6
Tonga	1	4.9	0.3	0	0.0	0.0	1	4.9	0.1
TOTAL	**10**	**1,495.9**	**100.0**	**17**	**2,134.4**	**100.0**	**27**	**3,630.3**	**100.0**

No. = Number, PRC = People's Republic of China.
Source: Asian Development Bank database.

Table A1.4: Hydropower Generation Loans

	1996—2000			2001—2006			TOTAL		
	No.	$ million	%	No.	$ million	%	No.	$ million	%
PRC	0	0.0	0.0	1	22.0	45.8	1	22.0	3.9
Lao PDR	1	52.0	10.2	1	20.0	41.7	2	72.0	12.9
Nepal	1	160.0	31.3	0	0.0	0.0	1	160.0	28.6
Pakistan	1	300.0	58.6	0	0.0	0.0	1	300.0	53.6
Samoa	0	0.0	0.0	1	6.0	12.5	1	6.0	1.1
TOTAL	**3**	**512.0**	**100.0**	**3**	**48.0**	**100.0**	**6**	**560.0**	**100.0**

No. = Number, PRC = People's Republic of China.
Source: Asian Development Bank database.

Table A1.5: Renewable Energy Generation Loans

	1996—2000			2001—2006			TOTAL		
	No.	$ million	%	No.	$ million	%	No.	$ million	%
PRC	1	58	36.7	0	0.0	0.0	1	58	18.2
India	1	100.0	63.3	0	0.0	0.0	1	100.0	31.3
Indonesia	0	0.0	0.0	1	161.0	100.0	1	161.0	50.5
TOTAL	**2**	**158.0**	**100.0**	**1**	**161.0**	**100.0**	**3**	**319.0**	**100.0**

No. = Number, PRC = People's Republic of China.
Source: Asian Development Bank database.

Table A1.6: Transmission and Distribution Loans

	1996—2000			2001—2006			TOTAL		
	No.	$ million	%	No.	$ million	%	No.	$ million	%
Afghanistan	0	0.0	0.0	2	61.5	2.8	2	61.5	1.6
Bangladesh	3	291.4	16.5	4	484.9	22.3	7	776.3	19.7
Bhutan	1	10.0	0.6	1	9.4	0.4	2	19.4	0.5
Cambodia	1	18.6	1.1	2	64.3	3.0	3	82.9	2.1
PRC	2	250.0	14.1	2	135.0	6.2	4	385.0	9.8
India	3	600.0	33.9	1	400.0	18.4	4	1,000.0	25.4
Indonesia	0	0.0	0.0	2	215.0	9.9	2	215.0	5.4
Kyrgyz Republic	1	30.0	1.7	0	0.0	0.0	1	30.0	0.8
Lao PDR	1	30.0	1.7	1	30.0	1.4	2	60.0	1.5
Maldives	1	7.0	0.4	0	0.0	0.0	1	7.0	0.2
Mongolia	2	50.0	2.8	0	0.0	0.0	2	50.0	1.3
Nepal	1	50.0	2.8	0	0.0	0.0	1	50.0	1.3
Pakistan	0	0.0	0.0	2	236.0	10.8	2	236.0	6.0
Philippines	2	196.8	11.1	1	40.0	1.8	3	236.8	6.0
Tajikistan	1	34.0	1.9	1	21.5	1.0	2	55.5	1.4
Thailand	1	100.0	5.7	0	0.0	0.0	1	100.0	2.5
Viet Nam	1	100.0	5.7	2	480.0	22.0	3	580.0	14.7
TOTAL	**21**	**1,767.8**	**100.0**	**21**	**2,177.6**	**100.0**	**42**	**3,945.4**	**100.0**

Lao PDR = Lao People's Democratic Republic, No. = number, PRC = People's Republic of China.
Source: Asian Development Bank database.

Table A1.7: Technical Assistance Grants in the Energy Sector

	1996—2000			2001—2006			TOTAL		
	No.	$ 000	%	No.	$ 000	%	No.	$ 000	%
Afghanistan	0	0.0	0.0	9	7,695.0	8.4	9	7,695.0	5.1
Azerbaijan	0	0.0	0.0	1	700.0	0.8	1	700.0	0.5
Bangladesh	10	4,052.0	7.0	7	4,970.0	5.4	17	9,022.0	6.1
Bhutan	3	1,700.0	2.9	5	2,700.0	2.9	8	4,400.0	2.9
Cambodia	4	900.0	1.5	3	1,970.0	2.2	7	2,870.0	1.9
PRC	19	11,561.7	19.9	19	10,323.0	11.3	38	21,884.7	14.6
Fiji Islands	0	0.0	0.0	2	1,050.0	1.1	2	1,050.0	0.7
India	16	8,290.0	14.3	14	7,245.0	7.9	30	15,535.0	10.4
Indonesia	6	3,385.0	5.8	7	4,943.0	5.4	13	8,328.0	5.6
Kyrgyz Republic	1	310.0	0.5	0	0.0	0.0	1	310.0	0.2
Lao PDR	7	3,570.0	6.1	3	2,500.0	2.7	10	6,070.0	4.1
Maldives	1	300.0	0.5	0	0.0	0.0	1	300.0	0.2
Mongolia	6	2,300.0	4.0	1	400.0	0.4	7	2,700.0	1.8
Nauru	0	0.0	0.0	1	375.0	0.4	1	375.0	0.3
Nepal	5	2,484.0	4.3	2	1,000.0	1.1	7	3,484.0	2.3
Pakistan	4	2,700.0	4.6	10	5,750.0	6.3	14	8,450.0	5.6
Papua New Guinea	0	0.0	0.0	2	1,700.0	1.9	2	1,700.0	1.1
Philippines	6	3,837.0	6.6	5	4,240.0	4.6	11	8,077.0	5.4
Regional	7	5,445.0	9.4	17	16,642.8	18.2	24	22,087.8	14.8
Samoa	1	150.0	0.3	3	1,200.0	1.3	4	1,350.0	0.9
Sri Lanka	3	1,425.0	2.5	3	2,150.0	2.3	6	3,575.0	2.4
Tajikistan	3	1,850.0	3.2	6	3,920.0	4.3	9	5,770.0	3.9
Thailand	2	1,100.0	1.9	0	0.0	0.0	2	1,100.0	0.7
Timor	0	0.0	0.0	1	400.0	0.4	1	400.0	0.3
Uzbekistan	0	0.0	0.0	3	1,250.0	1.4	3	1,250.0	0.8
Viet Nam	4	2,758.0	4.7	13	8,500.0	9.3	17	11,258.0	7.5
TOTAL	**108**	**58,117.7**	**100.0**	**137**	**91,623.8**	**100.0**	**245**	**149,741.5**	**100.0**

Lao PDR = Lao People's Democratic Republic, No. = number, PRC = People's Republic of China.
Source: Asian Development Bank database.

Table A1.8: Conventional Energy Generation Technical Assistance
(Other than Hydropower)

	1996—2000			2001—2006			TOTAL		
	No.	$ 000	%	No.	$ 000	%	No.	$ 000	%
Bangladesh	1	600.0	15.0	0	0.0	0.0	1	600.0	6.4
India	4	1,900.0	47.5	0	0.0	0.0	4	1,900.0	20.1
Indonesia	1	575.0	14.4	1	490.0	9.0	2	1,065.0	11.3
Pakistan	1	600.0	15.0	0	0.0	0.0	1	600.0	6.4
Papua New Guinea	0	0.0	0.0	1	1,000.0	18.4	1	1,000.0	10.6
Regional	0	0.0	0.0	2	1,700.0	31.3	2	1,700.0	18.0
Sri Lanka	1	325.0	8.1	0	0.0	0.0	1	325.0	3.4
Viet Nam	0	0.0	0.0	3	2,250.0	41.4	3	2,250.0	23.8
TOTAL	**8**	**4,000.0**	**100.0**	**7**	**5,440.0**	**100.0**	**15**	**9,440.0**	**100.0**

No. = Number.
Source: Asian Development Bank database.

Table A1.9: Energy Sector Development Technical Assistance

	1996—2000			2001—2006			TOTAL		
	No.	$ 000	%	No.	$ 000	%	No.	$ 000	%
Afghanistan	0	0.0	0.0	4	3,445.0	6.5	4	3,445.0	4.0
Bangladesh	4	1,740.0	5.4	5	3,220.0	6.0	9	4,960.0	5.8
Bhutan	1	500.0	1.6	2	1,100.0	2.1	3	1,600.0	1.9
Cambodia	2	300.0	0.9	1	1,000.0	1.9	3	1,300.0	1.5
PRC	11	6,634.7	20.6	15	7,773.0	14.6	26	14,407.7	16.8
India	10	5,190.0	16.1	13	6,745.0	12.6	23	11,935.0	14.0
Indonesia	4	2,241.0	7.0	3	2,243.0	4.2	7	4,484.0	5.2
Kyrgyz Republic	1	310.0	1.0	0	0.0	0.0	1	310.0	0.4
Lao PDR	4	2,340.0	7.3	0	0.0	0.0	4	2,340.0	2.7
Maldives	1	300.0	0.9	0	0.0	0.0	1	300.0	0.4
Mongolia	3	1,700.0	5.3	0	0.0	0.0	3	1,700.0	2.0
Nauru	0	0.0	0.0	1	375.0	0.7	1	375.0	0.4
Nepal	1	800.0	2.5	1	400.0	0.8	2	1,200.0	1.4
Pakistan	2	2,000.0	6.2	5	3,050.0	5.7	7	5,050.0	5.9
Philippines	4	2,662.0	8.3	4	3,790.0	7.1	8	6,452.0	7.5
Regional	4	1,145.0	3.6	14	14,042.8	26.3	18	15,187.8	17.8
Samoa	1	150.0	0.5	1	150.0	0.3	2	300.0	0.4
Sri Lanka	2	1,100.0	3.4	3	2,150.0	4.0	5	3,250.0	3.8
Tajikistan	1	850.0	2.6	2	520.0	1.0	3	1,370.0	1.6
Thailand	1	500.0	1.6	0	0.0	0.0	1	500.0	0.6
Timor	0	0.0	0.0	1	400.0	0.8	1	400.0	0.5
Uzbekistan	0	0.0	0.0	1	600.0	1.1	1	600.0	0.7
Viet Nam	3	1,760.0	5.5	5	2,325.0	4.4	8	4,085.0	4.8
TOTAL	**60**	**32,222.7**	**100.0**	**81**	**53,328.80**	**100.0**	**141**	**85,551.5**	**100.0**

Lao PDR = Lao People's Democratic Republic, No. = number, PRC = People's Republic of China.
Source: Asian Development Bank database.

Table A1.10: Hydropower Generation Technical Assistance

	1996—2000			2001—2006			TOTAL		
	No.	$ 000	%	No.	$ 000	%	No.	$ 000	%
Afghanistan	0	0.0	0.0	1	800.0	12.7	1	800.0	7.1
PRC	0	0.0	0.0	1	950.0	15.1	1	950.0	8.4
India	0	0.0	0.0	1	500.0	8.0	1	500.0	4.4
Lao PDR	1	140.0	2.8	2	1,700.0	27.1	3	1,840.0	16.3
Mongolia	1	150.0	3.0	0	0.0	0.0	1	150.0	1.3
Nepal	2	1,134.0	22.6	0	0.0	0.0	2	1,134.0	10.0
Pakistan	1	100.0	2.0	0	0.0	0.0	1	100.0	0.9
Regional	1	2,500.0	49.8	0	0.0	0.0	1	2,500.0	22.1
Tajikistan	0	0.0	0.0	1	600.0	9.6	1	600.0	5.3
Viet Nam	1	998.0	19.9	2	1,725.0	27.5	3	2,723.0	24.1
TOTAL	**7**	**5,022.0**	**100.0**	**8**	**6,275.0**	**100.0**	**15**	**11,297.0**	**100.0**

Lao PDR = Lao People's Democratic Republic, No. = number, PRC = People's Republic of China.
Source: Asian Development Bank database.

Table A1.11: Renewable Energy Generation Technical Assistance

	1996—2000			2001—2006			TOTAL		
	No.	$ 000	%	No.	$ 000	%	No.	$ 000	%
Afghanistan	0	0.0	0.0	1	750.0	7.9	1	750.0	6.6
Azerbaijan	0	0.0	0.0	1	700.0	7.3	1	700.0	6.1
PRC	2	1,256.0	67.7	3	1,600.0	16.8	5	2,856.0	25.0
Fiji Islands	0	0.0	0.0	1	650.0	6.8	1	650.0	5.7
India	1	600.0	32.3	0	0.0	0.0	1	600.0	5.3
Indonesia	0	0.0	0.0	2	1,300.0	13.6	2	1,300.0	11.4
Mongolia	0	0.0	0.0	1	400.0	4.2	1	400.0	3.5
Pakistan	0	0.0	0.0	2	700.0	7.3	2	700.0	6.1
Philippines	0	0.0	0.0	1	450.0	4.7	1	450.0	3.9
Samoa	0	0.0	0.0	2	1,050.0	11.0	2	1,050.0	9.2
Tajikistan	0	0.0	0.0	2	1,300.0	13.6	2	1,300.0	11.4
Uzbekistan	0	0.0	0.0	2	650.0	6.8	2	650.0	5.7
TOTAL	**3**	**1,856.0**	**100.0**	**18**	**9,550.0**	**100.0**	**21**	**11,406.0**	**100.0**

Lao PDR = Lao People's Democratic Republic, No. = number, PRC = People's Republic of China.
Source: Asian Development Bank database.

Table A1.12: Transmission and Generation Technical Assistance

	1996—2000			2001—2006			TOTAL		
	No.	$ 000	%	No.	$ 000	%	No.	$ 000	%
Afghanistan	0	0.0	0.0	3	2,700.0	15.9	3	2,700.0	8.4
Bangladesh	5	1,712.0	11.4	2	1,750.0	10.3	7	3,462.0	10.8
Bhutan	2	1,200.0	8.0	3	1,600.0	9.4	5	2,800.0	8.7
Cambodia	2	600.0	4.0	2	970.0	5.7	4	1,570.0	4.9
PRC	6	3,671.0	24.4	0	0.0	0.0	6	3,671.0	11.5
Fiji Islands	0	0.0	0.0	1	400.0	2.3	1	400.0	1.2
India	1	600.0	4.0	0	0.0	0.0	1	600.0	1.9
Indonesia	1	569.0	3.8	1	910.0	5.3	2	1,479.0	4.6
Lao PDR	2	1,090.0	7.3	1	800.0	4.7	3	1,890.0	5.9
Mongolia	2	450.0	3.0	0	0.0	0.0	2	450.0	1.4
Nepal	2	550.0	3.7	1	600.0	3.5	3	1,150.0	3.6
Pakistan	0	0.0	0.0	3	2,000.0	11.7	3	2,000.0	6.2
Papua New Guinea	0	0.0	0.0	1	700.0	4.1	1	700.0	2.2
Philippines	2	1,175.0	7.8	0	0.0	0.0	2	1,175.0	3.7
Regional	2	1,800.0	12.0	1	900.0	5.3	3	2,700.0	8.4
Tajikistan	2	1,000.0	6.7	1	1,500.0	8.8	3	2,500.0	7.8
Thailand	1	600.0	4.0	0	0.0	0.0	1	600.0	1.9
Viet Nam	0	0.0	0.0	3	2,200.0	12.9	3	2,200.0	6.9
TOTAL	**30**	**15,017.0**	**100.0**	**23**	**17,030.0**	**100.0**	**53**	**32,047.0**	**100.0**

Lao PDR = Lao People's Democratic Republic, No. = number, PRC = People's Republic of China.
Source: Asian Development Bank database.

Table A1.13: Regional Technical Assistance 1996-2006

RETA No.	Activity	Type	Total	Date Approved
Conventional Energy Generation (other than hydropower)				
6066	Feasibility Studies of the Turkmenistan-Afghanistan-Pakistan Natural Gas Pipeline Project	Study	1,000,000	6-Dec-02
6153	Turkmenistan-Afghanistan Pakistan Natural Gas Pipeline (Phase II)	Study	700,000	18-Dec-03
Energy Sector Development				
5695	Environmental Cooperation in Northeast Asia	Training	495,000	1-Aug-96
5736	India-Bangladesh Electricity Exchange	Study	100,000	19-May-97
5861	Capacity Building for Implementation of the Kyoto Protocol and the Clean Development Mechanism	Others	200,000	1-Sep-99
5865	Transboundary Environmental Cooperation in Northeast Asia	Study	350,000	13-Oct-99
5972	Promotion of Renewable Energy, Energy Efficiency, and Greenhouse Gas Abatement Projects	Study	5,000,000	4-Jan-01
6100	Study for a Regional Power Trade Operating Agreement in the Greater Mekong Subregion	Study	850,000	21-Apr-03
6102	Renewable Energy and Energy Efficiency Program for the Pacific	Study	600,000	28-Apr-03
6147	GMS Power Interconnection Project Phase I`	Study	800,000	12-Dec-03
6261	Energy Efficiency Initiative Consultation Workshop	Conference	150,000	6-Oct-05
6261	Energy Efficiency Initiative Consultation Workshop (Supplementary)	Conference	300,000	1-Feb-06
6267	Establishment of the Central Asia Regional Economic Cooperation (CAREC) Members Electricity Regulators Forum	Conference	500,000	3-Nov-05
6267	Establishment of the CAREC Members Electricity Regulators Forum (Supplementary)	Conference	242,800	10-Nov-06
6301	Developing the Greater Mekong Subregion Energy Sector Strategy	Others	900,000	3-Jan-06
6304	GMS Regional Power Trade Coordination and Development	Others	1,200,000	16-Jan-06
6322	Energy Sector Strategy and Development	Study	1,000,000	16-Jun-06
6346	Supporting the Inception of the Energy Efficiency Initiative in Developing Member Countries	Others	600,000	2-Oct-06
6368	Energy Sector Dialogue and South Asian Association for Regional Cooperation Energy Center Capacity Development	Others	1,000,000	14-Dec-06
6371	Mitigation of Transboundary Air Pollution from Coal-Fired Power Plants in North-East Asia	Study	900,000	18-Dec-06
Hydropower Generation				
5697	Se Kong-Se San and Nam Theun River Basins Hydropower Development Study	Study	2,500,000	22-Aug-96
Transmission & Distribution				
5920	Regional Indicative Master Plan on Power Interconnection in the Greater Mekong Subregion	Study	900,000	10-Jul-00
5960	Regional Power Transmission Modernization Project in Central Asian Republics	Study	900,000	12-Dec-00
6023	Regional Gas Transmission Improvement Project in the Central Asian Republics	Study	900,000	12-Mar-02

RETA = regional technical assistance.
Source: Asian Development Bank database.

Table A1.14: Project/Program Performance in the Energy Sector

Subsector	No. of Rated Projects				Proportion (%)		
	Highly Satisfactory/ Generally Satisfactory/ Satisfactory	Partially Satisfactory	Unsatisfactory	Total	Highly Satisfactory/ Generally Satisfactory/ Satisfactory	Partially Satisfactory	Unsatisfactory
Projects							
Conventional Energy Generation (other thank hydropower)	37	4		41	90.2	9.8	0.0
Energy Sector Development and Reforms	19	6	2	27	70.4	22.2	7.4
Hydropower	19	4		23	82.6	17.4	0.0
Transmission and Distribution	67	15	1	83	80.7	18.1	1.2
Subtotal	**142**	**29**	**3**	**174**	**81.6**	**16.7**	**1.7**

Source: Operations Evaluation Department database.

EVALUATION OF PRIVATE SECTOR LOANS

1. The Operations Evaluation Department (OED) of the Asian Development Bank (ADB) has evaluated several private sector transactions in the energy sector—both as part of the field work for this study and in stand-alone reports.

A. Company I

2. The Project was to (i) provide 2 x 360 megawatts (MW) of power capacity and a minimum of 3,500 gigawatt-hours (GWh) of annual electricity output to Company I to meet demand and reduce power shortages; (ii) improve the voltage and frequency stability of the power distribution system by providing a technologically-advanced base load plant; (iii) increase the availability of thermal power and reduce reliance on hydropower which depended on the amount of rainfall; and (iv) establish one of the first wholly foreign-owned build-operate-transfer (BOT) power projects in the People's Republic of China (PRC), financed on a limited recourse basis. The Project was negotiated between the sponsors and provincial authorities. ADB invested $10 million in equity, and provided $40 million in commercial cofinancing.

3. The Project was rated "successful". It is operating efficiently, and is selling power to PRC's eastern grid. However, in the future, the Project will face a potential risk because of increased supply conditions from 2006 onwards. Demand in Company I is expected to grow annually by 12% in the next 5 years. However, supply is expected to grow at a higher rate. New generation to be commissioned includes 5,000 MW of generation by the end of 2006, and another 3,000 MW of hydropower in Fujian Province. It will also make the Project less competitive, as the newer plant has higher technical efficiency than the Project. However, if exports to the PRC's eastern grid increase further and dry hydro conditions reappear, then the plant is likely to generate at higher levels than specified in the take-or-pay agreement. The operations at the Project indicate world best practice operation and maintenance (O&M); and promote economic efficiencies, environmental compliance, and safe operations which counter some of the technological disadvantages. These suggest that the Project will remain sustainable in the near future. After construction was completed, there were disputes about the appropriate tariff, despite carefully drafted legal agreements. Steps were taken to reduce the operational costs and to increase the amount of power dispatched. ADB played a constructive intermediary role during this process.

B. Company II

1. Bangladesh

4. The power project was developed under ADB technical assistance (TA) for a 450 MW gas-fired combined cycle power plant near Dhaka, with provision for expansion in a second phase to 900 MW. Under the TA, bidding documents and bidding and evaluation procedures were developed. The Project has been successfully commissioned. ADB has financed the Project through its private sector window, with a direct loan ($50 million), complementary cofinancing ($20 million), and a partial risk guarantee of $70 million.

5. The Project provides an example of the best practice for securing an equitable and large (independent power producer) IPP contract. It was the first major initiative designed to involve the private sector in improving Bangladesh's power sector. ADB played an instrumental role in planning and securing private sector participation by providing TA to help Bangladesh Power Development Board implement the Project by developing procedures, guidelines, and

documents for bidding among private sector sponsors, as well as evaluating their proposals. Transparent ICB and evaluation was carried out, resulting in the successful conclusion of a contract with Company II, a private power developer, winning the concession. The levelized tariff for power from the Project of $0.028 per kilowatt-hour (kWh) (at 2000 prices, with gas priced at $2.40/GJ) reduced Bangladesh's average costs of generation. The reasons for the success of the Project are as follows:

(i) The open bidding process under the ADB TA enabled Bangladesh to secure the benefits of competition for the concession and to avoid problems suffered in some other countries, where unsolicited bids were accepted and left power utilities saddled with high-cost and unsustainable contracts.
(ii) Several closely related contracts (concession, power purchase, and energy supply) could in large part be drawn up in parallel. This is a complex process, requiring specialist contract management skills, which ADB was able to mobilize for the benefit of the Bangladesh authorities.
(iii) The Project was structured to minimize costs by allocating risks to the parties that are best able to manage them:

    (a) The developer bears the capital cost variation risks.
    (b) The operator bears the risks of providing capacity/availability.
    (c) The buyer bears the market demand variation risk—since it manages dispatch and can minimize national costs of supply using the entire supply system.
    (d) ADB helped mitigate the credit risks for the sponsors and co-financiers through its participation in the project as a financier.
    (e) Energy cost variation risk is a pass-through cost to the buyer, who has the potential to pass this cost on to final consumers in the retail tariff.

6. Company II sold its equity[1] as a result of internal financial restructuring, but commented that the plant sale was considered highly successful as the plant and the associated power purchase agreement (PPA) were perceived a first class investment by the international financial community.

2. Sri Lanka

7. In November 2001, Company II (Sri Lanka) commissioned the first stage (110 MW) of a combined cycle plant, and the total capacity of 165 MW was commissioned by 2003. Since commissioning and a subsequent fire, the plant was operated at partial load until 2005. However, after recommissioning, the plant has run at world best practice levels of availability. The plant supplies base load power to the Sri Lanka power grid. ADB provided equity and political risk guarantees to the Project, and was instrumental in obtaining counter-guarantees from the Government of Sri Lanka.

8. Despite the financial problems of its electricity industry, the Government of Sri Lanka has not defaulted on payments, although there are significant delays. OED considers this Project "relevant" and "sustainable". However, OED notes that more ADB public sector involvement in the project may have led to the choice of an alternative base load plant (e.g., coal), as the high cost of imported diesel fuel and naphtha is now a major factor in the deteriorating financial condition of the power sector in Sri Lanka.

[1] The plant was sold in November 2003.

C. Company III

9. The project was the first step in liberalizing and commercializing the liquefied natural gas segment of the Indian gas industry, and encouraging the use of a clean environmentally friendly fuel. ADB made an equity investment of $9.7 million. Demand for energy in India continues to grow rapidly and the increased availability of energy at internationally competitive prices is critical for the development of the country. The Project has demonstrated it is possible to import LNG successfully at competitive prices, thereby supporting the liberalization of the gas sector and enhancing the level of private sector participation in the energy sector. Company III has provided a demonstration of the high standards of performance that can be achieved by a modern well-run public-private partnership managed on a commercial basis. Company III's business success has been excellent because of lower than expected operating expenses and interest costs. Economic sustainability was rated "excellent" because of the substantial benefits derived from meeting unmet demand and generating cost savings for firms that can use gas relative to naphtha. While the Project was assigned an environmental rating of category A at project appraisal, in practice, social and environmental impacts have been minimal and the main issues relate to the safety of the mooring facilities during the monsoon period. GDF International, A shareholder in Company III which has more than 30 years of liquefied natural gas experience, is providing assistance to develop and refine the mooring procedures.

10. ADB played a critical role in facilitating the liberalization of the gas market and then helping mitigate investor and lender concerns, in what was a new and untested product and technology in India where there were limited skills and experience available locally. ADB obtained a position on the board of directors and contributed to improvements in corporate governance by heading the Company III audit committee.

UNBUNDLING OF THE ELECTRICITY SECTOR

1. The unbundling of the power sector involves separating government responsibilities for power sector policy from the regulation of the industry to ensure a fair balance between the interests of investors and consumers. It also involves splitting power sector monopolies into generation, transmission, and distribution companies. The unbundling is an important step on the road to corporatization or possible later privatization, in that it enables greater private involvement. Asian countries have pursued unbundling policies with varying degrees of success.

2. ADB has sponsored unbundling as part of project and program loans across most developing member countries (DMCs). There has been little progress in Sri Lanka, for example, but Bangladesh, India, Pakistan and Philippines are all at different stages in the unbundling process, as part of reform programs sponsored by the Asian Development Bank (ADB). The outcomes for India, Pakistan, and Sri Lanka are discussed in more detail below.

A. India

3. In India, ADB provided program assistance to three state electricity boards (SEBs): Gujarat, Assam and Madhya Pradesh. The overall conclusion from the operations evaluation mission (OEM) is that ADB program assistance, to date, has generally been successful as a result of targeting the assistance to sectors which were thoroughly committed to change. This includes the state governments of Gujarat, Madhya Pradesh, and Assam; their respective SEBs; non-executive employees of the SEBs; and independent state-appointed regulators. In all three SEBs evaluated, unbundling has been achieved and new separate corporate entities with "clean" balance sheets have been established as a result of restructuring. The restructuring included, for instance, partial state assumption of liabilities, transparent subsidies, renegotiation of power purchase agreements, rationalization of state-owned generation to ensure merit order dispatch, and changed organizational structures and cultures that were refocused on service delivery. Each of the SEBs have maintained a "shell" organization to service liabilities that were not directly related to the assets of the unbundled corporations, and serve as a "single buyer" for the distribution companies. The unbundled generation and transmission organizations are assessed as having a good probability of sustaining independent operations and becoming self-funding. All states indicated that ADB assistance was catalytic in providing the impetus to implement the reform process.

4. The transformation process for unbundling the distribution companies is well developed but has not been completed. The distribution companies do not yet have complete independence from the parent "shell" company and still rely on the shell company for some of their strategic functions.

5. The OEM findings suggest that more assistance may be required to maintain the momentum created by the program loans in order to develop the distribution companies into totally independent organizations with best practice governance and risk management policies and procedures, and thus enable them to become self-sustaining. ADB should consider some additional assistance with human resource development, and the procurement and development of information technology (IT) systems that support planning and governance. In Assam, there is a concern that the split into three distribution companies may not have been optimal, and there are concerns that required future staff expertise and numbers, as well as unbalanced customer mixes, may lead to at least one unsustainable distribution company. The OEM has observed conflicting information regarding this issue, both supporting and

contradicting the concerns, and recommends that this issue be reviewed and resolved as a matter of urgency. To date, the reform outcomes are rated "successful". However, sustainability depends on ongoing commitment and funding.

B. Sri Lanka

6. Since 1998, ADB has worked closely with the Government of Sri Lanka and power utilities in developing a new model for the power sector. TA projects[1] have provided the Government with support in sector restructuring. Back-to-office reports of ADB review missions reflect continuous policy dialogue with the Government on this issue. Since 1998, a detailed model for reform has been developed. Legislation is in place and awaits confirmation or modification from the Government. The Public Utilities Commission of Sri Lanka was established in 2002 and has a limited staff. It is ready to commence regulation of the power sector once the necessary legislation is passed to confirm the regulator's role. Basic documentation—such as licenses, a grid code, and implementing rules and regulations—has been prepared. The internal structure of Ceylon Electricity Board is already unbundled into a generation company, a transmission company, and four distribution companies. Assets and liabilities have been identified to be associated with each business, and the accounting separation of the business could be accomplished quickly. The human resources issues associated with unbundling have been considered in detail, and agreement has been reached on most points. There are plans for a ministerial advisory committee to take on the role of recommending appointments to utility boards, thus increasing independence.

7. The Government has been unable to take the final steps toward implementation of the restructuring and is in effect holding back from a policy that it has endorsed publicly for almost 10 years. This is a result of a combination of opposition from power sector unions in Ceylon Electricity Board and political opposition within the currently governing coalition.

C. Pakistan

8. In Pakistan, there has been significant progress in unbundling since ADB loans[2] were approved in 2000. These major program loans were designed to support reform in the energy sector and were accompanied by TA support through loan 1809 to help the reform process. The loan was linked to Pakistan's structural adjustment program, and arrangements were closely coordinated with the World Bank and International Monetary Fund, which also provided Pakistan with loans at around the same time. The loan was not linked to any power sector projects and the Ministry of Finance was the Executing Agency (EA), with various power sector institutions responsible for aspects of reform implementation. A wide range of loan conditions were agreed in a six-page letter from the Government, along with an 11-page policy matrix. These covered the institutional and financial restructuring of the Waste and Power Development Authority and Karachi Electricity Supply Corporation (KESC), along with the development of the role of the power regulator. The loan was structured in four tranches, including an incentive tranche, with disbursement linked to performance on the reform process.

[1] ADB. 1998. *Technical Assistance (3141) to Sri Lanka for Preparing the Power Sector Restructuring Project* and 2002. *Technical Assistance (3857) to Sri Lanka for Restructuring the Power Sector*. Manila.
[2] ADB. 2000. *Loan 1807/1808 Proposed Loans to Pakistan for Energy Sector Restructuring Program*. Manila

9. There has been significant progress with the unbundling. Pakistan has an effective regulator; and various generations, transmission, and nine distribution companies have been created out of the Waste and Power Development Authority. KESC has been sold through privatization to a local investor. There is still much work to be done to complete the unbundling process. The distribution companies are not yet fully autonomous. However, there has been significant progress and there is optimism in the industry that the outstanding issues can be resolved.

INCENTIVE-BASED REGULATIONS

1. There are a number of forms of rate regulation, which are based on some form of cash flow (or forward forecast analysis) over a predefined regulatory period, which is greater than 1 year. The primary concept is to set in place price control arrangements which guide the regulated entity in setting rates over a defined period, with only limited ability for the regulator to intervene in the rate-setting process.

2. At each rate reset, the financial and operational forecasts, price control mechanisms, and rate-setting process are all reviewed and redefined. With incentive-based price control, the forward cash flows are used to generate an expected cash flow model (which is a form of cost of service forecast), and this in turn is used to develop the price control equations.

3. As the regulatory period progresses, the price control equations are used to regulate the level of the rates charged, and the regulator's primary role is to ensure that the price control equations are correctly applied and that the rates are set within the framework specified.

4. Thus, the incentive is for the regulated entity to perform better than the forecasts during the price control period. Cost reductions in all forms are encouraged by the price control mechanism, while ensuring a reasonable rate of return to the business as a whole. Depending on the specified price control mechanism, the efficiency gains are retained by the regulated entity for the current regulatory period (this provides certainty to the regulated entity), and are potentially shared between the regulated entity and its customers in the following regulatory period(s).

5. The primary costs and benefits of incentive-based regulation are provided in Table A4.

Table A4: Costs and Benefits of Performance-Based Regulation

Cost	Benefits
Depending on the price control mechanism chosen, this can have a lower rate of return on its investment than provided in the "benchmark"	Permits the regulated entity to make a higher return on investment than the "benchmark" rate of return in the forward forecasts, which forms the primary incentive mechanism to reduce costs for a specified level of service performance
Direct costs of regulation may be higher because of the requirement to review forecasts and network performance in more detail (offset by a much lower frequency of detailed review than under rate of return regulation)	Potential to provide significant incentives to: • make efficient investments; • lower costs overall; and • focus on managing the transmission network to the benefit of the market.
	Potential in the longer term to promote lower prices to consumers.
	Depending on the detail of the price control mechanism chosen, can lead to smoother changes in prices and less price volatility
	Generally, is more consistent with the principle of moving toward "light-handed" regulation, remembering that specifying the price control framework requires more attention to detail and written constraints than rate of return regulation. This leads to the regulated entity taking more responsibility for the outcomes of its rate decisions, so it operates in an environment with less regulatory interference.

Source: 2006: PricewaterhouseCoopers.

GOVERNANCE AND THE ENERGY SECTOR

A. Introduction

1. The energy sector plays a key role in a country's development. The sector is often characterized as vital, complex, and multidimensional. Until recently, most power sectors in developing countries operated within large-scale capital expenditures and investments, making them attractive and at the same time vulnerable to various public and private interests. Power utilities in these countries have had a high level of government control and operated under state monopolies. Many countries[1] have initiated some level of reforms in their power sector, but the achievements of reform were much slower than expected. Although most reforms have effectively reduced severe energy shortages, little attention was paid to developing simultaneously sustainable systems that address other equally important issues—such as the financial inefficiency and unsustainable political support that weakens the operations of many power utilities. The lack of financial and monitoring systems in the sector has resulted in poor decision making and the proliferation of opaque transactions, which had encouraged power service utilities to be used as a political instrument for political patronage and the exercise of public power for political gain.

2. Effective governance is most visible when it is absent. Lack of good governance is one of the major impediments to energy reform processes and is often synonymous with (i) lack of a stable political support; (ii) lack of rule of law; (iii) weak institutions to implement reforms; and (iv) widespread corruption. These are some of the bottlenecks that prevent the sector from effective operation and delivery of results-based (outcome/impact-oriented) reforms that lead to sustainable operations and service delivery of the power.

3. Promoting good governance has become a major focus in most development agenda of transition and developing countries. The attention for improved governance has been increasing consistently and has been considered an integral mechanism to deliver development effectively, improve the impact of investment and project effectiveness, and better deliver benefits (outcomes/impacts) to stakeholders. Addressing governance issues also strengthens signals regarding the capabilities of governments to service its people and address poverty reduction by equitably delivering power to poor areas at an affordable price. In essence, good governance promotes norms of behavior that ensure governments will deliver what they promised to deliver.

4. The challenges that surround energy sector governance are enormous. Their impact on investment, financial stability, competitiveness, and economic development are as high as their impact on the poor. Unstable supply caused by inefficiencies force the poor to absorb inequitable costs of power. For example, cost recovery is one of the biggest issues facing the energy sector in Asia. In many countries, consumer revenues do not cover the cost of the energy supply or the environmental costs associated with energy generation and distribution. This situation is not conducive to private sector investment because of the associated high cost of demands from all kinds of concessions, and the high price associated for risk mitigation. Large direct or indirect subsidies in turn create fertile ground for corruption—from petty to grand.

5. Governance systems vary between energy subsectors, depending on the economic conditions. The term "governance" is used to describe the complex set of policy processes and control relationships that occur between the various players in the energy sector. Table A5.1

[1] The World Bank has conducted a power reform survey on 115 countries. The report found that all but 24 had initiated some level of reforms in their power sector.

shows key energy governance players. Some important aspects of energy governance are: (i) the process by which policy is formulated and implemented; (ii) interaction of public authorities (both at the central and government level and between various tiers of governments); (iii) the role of the state in owning and/or managing energy industries; (iv) enabling markets to function competitively and efficiently; and (v) the regulatory process, where markets fail and where externalities are not incorporated.

Table A5.1: Key Energy Governance Players

Key Energy Governance Player	**Descriptions** (examples)
Policy Maker	• Parliament, the minister, and institutions empowered to govern certain activities or institutions, such as regulators or local authorities
Energy Industries	• Coal, petroleum, nuclear, electricity, or renewable energy subsectors; and the various industry owners, including the state and private shareholders
Government Departments	• National, state and provincial governments, and local authorities;
Energy Consumers	• Households, agriculture, or large electricity-based industries
Supranational bodies	• Regional trade blocs
Other Stakeholders	• Organized labor, civic organizations, researchers, and energy service companies

Source: Rao, G.P. 2006. *Anti-corruption in the Power Sector - A Background paper for the World Bank Energy Week*.

6. The challenges that surround energy sector governance are enormous. Their impact on investment, financial stability, competitiveness, and economic development are as high as their impact on the poor. Unstable supply caused by inefficiencies force the poor to absorb inequitable costs of power. For example, cost recovery is one of the biggest issues facing the energy sector in Asia. In many countries, consumer revenues do not cover the cost of the energy supply or the environmental costs associated with energy generation and distribution. This situation is not conducive to private sector investment because of the associated high cost of demands from all kinds of concessions, and the high price associated for risk mitigation. Large direct or indirect subsidies in turn create fertile ground for corruption—from petty to grand.

1. Congruence Between ADB Energy and Governance Policy Initiatives

7. The ADB energy policy identifies governance as one of its major operational priorities for the energy sector.[2] ADB considers that building up good governance in the sector would translate into substantial benefits that are commensurate to the large investment provided to the sector. The energy policy considers operational challenges and issues that can be best addressed by placing significant attention to improve governance in the sector's operation. These include (i) financial control systems, (ii) procurement of goods and services, (iii) improvements in productivity and efficiency of the system, (iv) occurrence of high electricity losses in transmission and distribution, and (v) theft and corruption.

[2] ADB will undertake interventions in the energy sector that support the overarching objective of poverty reduction. The operational priorities relevant to the energy sector are (i) environmental protection, (ii) good governance, (iii) private sector development, and (iv) regional and subregional cooperation. (Source: ADB. 2000. *Energy Policy*. Manila [para 2, page 1].)

8. Promoting good governance is a crosscutting agenda of ADB in all of its sectors and development agenda.[3] The 2000 Review includes efforts to address good governance in the sector in its agenda and strategy. It considers that increasing private participation, transparency, and predictability through introduction of competitive markets and profit considerations will have beneficial effects on promoting competition among service providers. Competition will promote the use of innovative methods to increase revenue, and provides a natural incentive to curtail corrupt practices. As governments distance themselves from the management of the energy sector by opening the sector for private sector initiatives, the regulator's role increases and accountability improves. The role of the regulator is extremely important. It needs to exhibit capability and vigilance; and be empowered to prevent, detect, and punish unscrupulous behavior and safeguard the interest of small consumers.

9. ADB adopted a governance policy in 1995 and anti-corruption policy in 1998. The second Medium Term Strategy identified improving governance and preventing corruption as one of ADB's five corporate priorities.[4] ADB's Second Governance and Anti-corruption Action Plan (GACAP II) is designed to improve ADB's performance in the implementation of governance and anticorruption policies, with an increasing focus on the sectors which ADB is involved. It is focused on helping ADB achieve key results in four areas: (i) improved identification and management of governance and corruption risks in country strategies and programs, and annual country portfolio review missions; (ii) strengthened governance and anticorruption components in program and project design; (iii) strengthened program and project administration and portfolio management; and (iv) improved organizational structure, human resources, and access to expertise. Implementation of the GACAP II is expected to enable developing member countries (DMCs), in partnership with ADB, to design and deliver better quality projects and programs.

10. ADB's policy on governance defines it as "the manner in which power is exercised in the management of a country's economic and social resources for development". ADB's concept of governance focuses on the ingredients for effective management, irrespective of the precise set of economic policies that find favor with a government. Table A5.2 shows the relevance of the four elements of good governance in ADB's Energy Policy. There is a high degree of congruence.

2. Governance in ADB Energy Projects and Technical Assistance

11. The Operations Evaluation Department (OED) randomly selected 30 loans and TA from all 2000–2006 ADB energy projects to determine the extent to which governance provisions had been integrated in the design of the projects. Nine out of the 60 energy loans and 21 out of 130 TA were selected and reviewed. Eight of the energy sector loans provided explicit stipulations on good governance and anticorruption in their report and recommendation of the President to the Board of Directors (RRP). General provisions ensuring that governance is taken at project entry included: (i) briefing on ADB's *Anticorruption Policy* (1998) with the central and local governments and executing agencies, drawing close attention to sections on fraud and corruption added to ADB's *Procurement Guidelines* (2006) and *Guidelines on the Use of Consultants* (2006) which stipulate the need for bidders, suppliers, contractors, and consultants

[3] ADB's Medium-Term Strategy II aims to strengthen the impact of ADB's assistance on poverty reduction by focusing on five strategic priorities: (i) catalyzing investment, (ii) strengthening inclusiveness, (iii) promoting regional cooperation and integration, (iv) managing the environment, and (v) improving governance and preventing corruption.

[4] The four essential components of good governance are (i) accountability, (ii) participation, (iii) predictability, and (iv) transparency

to observe the highest standard of ethics in the procurement and execution of contracts; (ii) use of an internationally oriented accounting system that has both internal and external audit systems; (iii) capacity building on financial management, enterprise reforms and governance, human resources development, performance management, environmental, and benefits monitoring and energy improvement activities; and (iv) inclusion of specific assurances such as (a) compliance with local laws and policies, (b) putting in place monitoring programs, and (c) establishment of an independent anticorruption commission. Some projects have included covenants and assurances to ensure that initiatives on good governance and anticorruption are given sufficient attention during project implementation. Examples based on the reviewed energy projects are presented in Table A5.3.

Table A5.2: Elements of Good Governance and ADB's Energy Policy

Element	Description	Areas of Action	Consistent with ADB Energy Policy
A. Accountability	• Making public office answerable for government behavior • Measure of public official performance • Evaluation of economic and financial performance • Effectiveness of policy formulation, implementation, and efficiency in resource use	• Public sector management • Public enterprise management and reform • Public financial management • Civil service reform	✓ ✓ ✓
B. Participation	• Considers people to be agents of development • Provides opportunity to beneficiaries to improve design and implementation of public programs and projects • Increases ownership and enhances results • Interface between public and private entities • Bottom-up approach to economic and social development	• Participation of beneficiaries and affected groups • Public-private sector interface • Decentralization of public and service delivery functions (empowerment of local government) • Cooperation with NGOs	✓ ✓ ✓
C. Predictability	• Existence of laws, regulations, and policies • Fair and consistent application of rule of law • Existence of legal frameworks to ensure that: (i) business risk can be assessed rationally, (ii) transaction costs are lowered, and (iii) governmental arbitrariness is minimized	• Law and development • Legal frameworks for private sector development	✓ ✓
D. Transparency	• Availability of information to the public and clarity about government rules, regulations, and decisions • Access to accurate and timely information	• Disclosure of information	✓

ADB = Asian Development Bank, NGO = non-government organization.
Source: ADB Governance Policy, and the 2000 Review.

Table A5.3: Specific Provisions on Governance and Anticorruption in ADB 2000—2006 Loans

ADB Energy Projects (2000–2006)	Explicit Provisions for Governance and Anticorruption
(1) L2146-PRC: Coal Mine Methane Development Project	ADB's program for the PRC includes assistance that will improve governance and provide incentives to reduce the incidence of corruption in the longer term. Shanxi Provincial Government SPG will take the following anticorruption actions: (i) involve full-time officials from SPG to periodically review, together with staff of the project management team, and the concerned tendering companies, bidding process, delivery of equipment and materials, and installation, construction, and operation; (ii) introduce a dual-signing system, in which the winning bidder for a civil works contract also signs an anticorruption contract with the employer; and (iii) periodically inspect civil works contractor's activities related to fund withdrawals and settlements.
(2) L2189-BAN: Gas Transmission and Development Project	ADB extended support to the Government by establishing an independent Anti-Corruption Commission (ACC) followed by a legislation, passed in February 2004. Through its core governance intervention in the form of the TA supporting good governance initiatives, ADB is working for operationalization of ACC to foster an independent mechanism for anticorruption and development of a national integrity strategy to provide a strategic policy framework for anticorruption in Bangladesh. The proposed Project incorporates several specific anticorruption measures like: (i) strict financial management with strengthened government monitoring and independent monitoring, (ii) strong project supervision with appropriate consultancy input, (iii) regular independent performance auditing to monitor project implementation, and (iv) random and independent spot checks.
(3) L1803-IND: Gujarat Power Sector Development Project	Governance related issues will be addressed through (i) reorganization of the sector along functional lines; (ii) appointment of an independent regulatory commission to set tariffs and structure competition in the sector; and (iii) gradual replacement of appointees of the state government on the boards of management of the sector companies with experts.
(4) L1807-PAK: Energy Sector Restructuring Program	Expanding the role of the sector regulator under the Program will also ensure good governance and efficient performance. Privatization of Karachi Electricity Supply Corporation (KESC) is also strongly a governance issue that will act to reduce political and socioeconomic risks.
(5) L2152-IND: Power Grid Transmission (Sector)	Enhancing governance through corporatization, independence of boards of directors from the Government, delegation of powers to management, computerized management information systems, and commercialization of activities.

ADB = Asian Development Bank, PRC = People's Republic of China, RRP = Report and Recommendation of the President to the Board of Directors, TA = Technical Assistance.

Sources: ADB. 2004. Loan to the People's Republic of China for Coal Mine Methane Development Project, ADB. 2005. Loan to Bangladesh for Gas Transmission and Development Project, ADB. 2000. Loan to Pakistan on Energy Sector Restructuring Program.

12. All loan projects under the OED review also stipulated conditions designed to enhanced the other pillars of good governance (such as transparency, accountability, and participation) in the project design. Table A5.4 sets out examples of the measures adopted by ADB to promote good governance.

Table A5.4: Governance Measures

Area	Measures
Procurement	• Use of ADB guidelines on procurement and consulting services • Use of ADB's standard bidding documents and standard request for proposal documents for procurement and recruitment of consultants • Bid specifications and packaging to be prepared to ensure maximum competition under international competitive bidding procedures • Capacity development of sector entities on e-procurement to increase transparency, accountability, and efficiency in procurement
Financial Management and Audit	• Regular access to the executing agency's accounting and control systems to monitor expenditures and other financial transactions and safe custody of project-financed assets • Capacity development of sector companies in accounting and internal control systems, financial management, and audit capabilities • Expanded use of advanced information and communication technology-based financial management systems to ensure efficient and accountable financial management systems • Financial statements to be audited by external auditors acceptable to ADB and regularly published and reported to the shareholders • Measurable financial performance indicators for each company to be established, evaluated, and benchmarked • Introduction of an appropriate internal audit system through the capacity building program • Implementation of an operational risk mitigation action plan, and undertaking a joint operational risk assessment with development partners
Institutional/ Corporate Governance	• Public disclosure of operational and financial performance of sector companies to improve transparency • Fully functional sector regulator to ensure a level playing field among sector entities and to improve sector governance • Continued introduction of a new corporate culture through further commercialization • Appointment of independent board of directors • Revision of Board recruitment procedures • Development of formal code of conduct for Board of Directors • Delegation of powers to companies' management • Promotion of private sector participation and public-private partnership • Expansion of computerized billing system

ADB = Asian Development Bank.
Source: ADB. 1995. *Governance: Sound Development Management*. Manila.

13. Boxes A5.1 and A5.2 illustrate initiatives to integrate good governance in India's energy reform process, and the resulting outcomes and impacts of improved state electricity board and sector performance.

Box A5.1: Promoting Governance in India's State Electricity Board Reform

Asian Development Bank (ADB) program assistance to India's three state electricity boards (SEBs) (Gujarat, Assam, and Madhya Pradesh) has generally been successful, as the assistance was targeted to sectors that were committed to change. In all three SEBs evaluated, unbundling was achieved and new separate corporate entities with "clean" balance sheets have been established as a result of restructuring. This sector restructuring resulted in outcomes and impacts reflecting qualities of good governance such as the following.

Restructuring Strategy in the Reform

- Partial state assumption of liabilities
- Transparent subsidies
- Renegotiation of power purchase agreements
- Rationalization of state-owned generation to ensure merit order dispatch
- Changed organizational structures and cultures, which were refocused on service delivery and directly involved customers

Pillars of Good Governance

- Increased accountability
- Promote transparency
- Increased predictability and
- Increased participation

Outcomes of Reform

The state regulators have developed independence and are proactively regulating the SEBs' generation, transmission, and distribution sectors with performance-based regulation. The regulators have, for instance, targeted improvements in supply, service levels, and mandated reductions in non-technical losses. Furthermore, the regulators are actively promoting consumer participation in the reform and regulatory processes. They are gradually becoming financially independent by generating their own revenues, and are actively participating as a group at the national level to develop their expertise.

Impacts

The impacts of the Indian reforms have increased competitiveness and had a demonstration effect between the states' electricity sectors as well as their regulators. This has added momentum to the federal impetus for reform and has isolated national antireform movements.

Challenges Ahead

The least effective changes have been in the areas of human resource development and in attaining the desired level of governance in the distribution sector, including management and accounting practices. However, this is outweighed by the success in effective policy change which were a result of the covenants instituted by ADB, with high "hurdles" and the conditional release of loan tranches upon meeting covenants. These have proven to be a successful approach to meeting policy changes.

Source: ADB. 2007. *Sector Assistance Program Evaluation of the Indian Power Sector*. Manila. (forthcoming).

Box A5.2: The Gujarat Power Sector Development Program

In 2000, the Gujarat Power Sector Development Program initiated reforms to address governance-related issues through: (i) reorganization of the sector along functional lines; (ii) appointment of an independent regulatory commission to set tariffs and structure competition in the sector; and (iii) gradual replacement of appointees of the state government on the boards of management of the sector companies with experts. ICRA Limited, which carries out ratings of state power utilities, has noted significant improvements in Gujarat in recent years—including significant reductions in financial losses, formulation of a financial restructuring program, and continued government support for reform. ADB's assistance has been successful, and there may be learning points from the Gujarat experience that can be applied in other states. The financial and organizational restructuring have turned around the finances of Gujarat State Electricity Board from a loss-making enterprise to a profitable organization without an increase in tariffs over a four-year period. The average cost of service has fallen from Rs4.15 per kWh in 2003/4 to Rs3.53 in 2005/6, and average realization has increased from Rs2.84 to Rs2.98 per unit without any increase in tariffs. Subsidies have been reduced from 19.2% of revenues to 15.9%, and when included in annual revenues have brought the companies into a net profit situation. A number of factors contributed to the rapid success of the Gujarat reform program. These include the following.

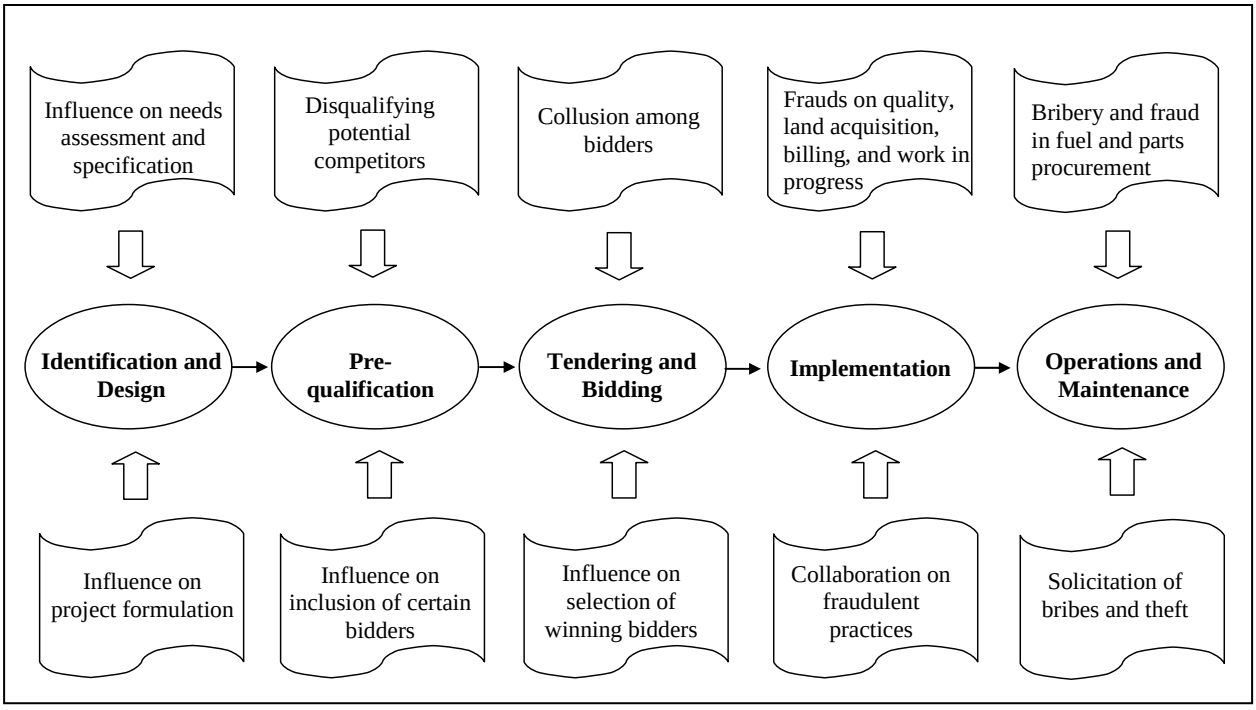
- There was already agreement between the state government and the utility on the need for restructuring and the approach to adopt before ADB became involved. The Gujarat state government had passed the necessary legislation before the federal Electricity Act, 2003, reflecting the local understanding need of the need for change. Government has maintained this commitment. It has, for example, encouraged the recruitment of professional management and avoided political appointments, taken over some of the sector's debt, and committed to provide continuing financial support for agricultural consumers.
- There is a broadly commercial culture in the state of Gujarat. As a result, the need for reform has widespread acceptance among consumers.
- Staff accepted reforms as a result of tripartite agreements between the state government, the utility, and unions. All 50,000 staff received commitments about job continuity and, in many cases, staff were promoted as a result of restructuring. Some 3,000 people have been recruited to replace retirees, with a three-year trial period. Overall, the companies have the technical and commercial skills needed to reform the utility, and performance has been enhanced through target setting for staff.
- All rural feeders were bifurcated to separate power for villages from power for agricultural consumers. Agricultural consumers now obtain power for a predictable 8 hours per day and at a concessionary rate. Rural villages and households are continuously connected. Because agriculture power is not supplied at system peak, 500 MW of load has been removed from the peak and the system load curve is almost flat. Households are happy to have a continuous supply while farmers appreciate the improved reliability of supply during the eight-hour period and have accepted the change.
- Metering is now compulsory for all consumers. The metering program is not yet complete, with about 400,000 (out of 8,000,000) customers still unmetered. However, 60% of meters have been replaced and meters have now been placed on all feeders, enabling greatly improved monitoring of losses.
- A growing industrial sector in Gujarat is keeping revenue buoyant.
- There were significant opportunities for cost reduction and performance improvement. Negotiations with IPPs resulted in reductions in unit rates from Rs2.34 in 2003/04 to Rs2.06 in 2004/05 and Rs1.85 in 2006/07. The load factor was improved on generation plant, and fuel management was improved. Interest rates on borrowings were renegotiated and reduced. As a result of better system monitoring, transmission and distribution losses were reduced by 6–7% over the past 2–3 years and are now around 26–27%. Collection efficiency was improved from 91% to 93% of billings to around 100%.
- Tariff levels and structures have been adequate to sustain cash flow. The regulator granted increases in 2000, including a 300% increase for agricultural consumers. The next increase was in June 2004, when rates rose by about 1%, and a further application was being processed at the time of the mission. Overall, there should be a profit across the group in 2005/06.
- The quality of regulation has been good. The regulator has appropriate expertise and has pressed for improvements in performance. There are good communications with all power sector stakeholders. There is transparency in the regulator through publication on the Commission's website. The regulator has also published a future road map for the sector, covering such topics as open access and consumer choice.

ADB = Asian Development Bank, kWh = kilowatt-hour, MW = megawatt, IPP = independent power producer.
Sources:
1. Rao, G.P. 2006. *Anti-corruption in the Power Sector - A Background paper for the World Bank Energy Week*.
2. Operations evaluation mission.

B. Potential for Corruption in the Energy Sector

14. Because energy is central to almost all socioeconomic activities, and power is essential to production and operation, the energy sector is a target and source of corruption. Individuals and institutions that control access to energy sources, transformation, and distribution of energy hold significant power. The sector's potential of generating economic rents from energy extraction, transformation, and use, and the large capital investments it engages, makes the sector vulnerable to corruption. Opportunities for corruption occur at all stages—from energy extraction to transformation and distribution. At the project level, corruption occurs during the early stages of power project identification and formulation, project tendering, and bidding; operation and maintenance. Corruption in the sector is difficult to prove and determine because of the complex systems and the multidimensional scale to which they operate in the development of a country. Corruption may occur in developing and transitional economies because of lack of, or weak judicial and regulatory systems, and the existence of a political culture that overlooks corrupt acts.[5] The central role of government agencies that oversee virtually all aspects of the energy sector, whether privatized or not, make transactions and decision making less efficient because decisions were often made in favor of political interests. The limited prosecution of corruption cases and low conviction rates make it difficult to deter corrupt practices in the sector. Figure A5.1 indicates the sources of corruption in the sector.

Figure A5.1: Potential Sources of Corruption at Different Stages Of the Project Cycle for Power Projects



Source: Adopted from Transparency International, ADB. 2004. *Sector Assistance Program Evaluation of Philippine Power Sector*, Operations Evaluation Department, Manila.

[5] Mathias, Ruth. 2002. *Corruption and the Energy Sector.* Paper presented during a workshop on Sectoral Perspectives on Corruption sponsored by the United States Agency for International Development (USAID). Washington, DC.

15. The forms and extent of corruption in the energy sector affect the demand and supply-side of energy operations differently. At the consumer level, "petty corruption" involving minor bribery and collusion happen because of consumers' willingness to pay for convenience (getting new connections quickly, avoiding time-consuming paperwork) has created a supply-side pressure that perpetuates this form of corruption. Corruption on energy transformation and distribution is manifested through:

(i) non-technical system losses (e.g., falsified meter readings, altered invoices, and illegal purchase);[6]
(ii) interference in the flow of funds/barter/offsets within the system and to fuel suppliers;
(iii) manipulation of the flows of electricity to favored customers;
(iv) opaque uneconomic import arrangements;
(v) bid manipulation through "limited" specifications and/or pre-qualifications;
(vi) commission paid by bidders for contract awards;
(vii) collusion of bidders; and
(viii) payments for positions favorable to extracting corrupt payments.

16. Box A5.3 illustrates potential areas where corruption occurs in different segments of the sector and the efforts of the Government of India to combat corruption.

[6] Surveys sponsored by the World Bank as part of load management and agricultural electricity studies in India have shown that 20–30% of electricity attributed to unmetered agricultural consumption is appropriated by high-income households, industry, and large commercial establishments such as shopping malls. Such "appropriations" constitute corrupt behavior if those entities who receive electricity free or at reduced prices provide in return financial or political support to individuals who are in charge of payment collection.

Box A5.3: Anticorruption Efforts in the Indian Energy Sector

The Regulatory Commission in India found that the finances of the state electricity boards were unsustainable, as a large farm sector had no metering of its power consumption and was supplied power at a nominal tariff. There were also large transmission and commercial losses (39% in the case of Madhya Pradesh). Commercial loss was a euphemism for theft. The Commission found that most of the corruption in the retail supply revolved round metering and billing. The Commission considered that bringing down the commercial losses—as the easiest and quickest to tackle, with only a small requirement of funds—should be given the highest priority. This was among the first issues addressed in the reform process.

Forms of Theft and Actions Taken by the State Electricity Regulators

Generation. Corruption arose in cases where ownership of generating companies was in the private sector, and the power was sold to the Licensees (public sector). Money paid by the Licensee was, in some cases, for power not supplied. There was collusion between the generator and the person in charge of recording the supply. No supervision of the recording of power received was made, nor was there any energy audit. This was taking place largely in cases of smaller, unconventional energy generators. Similarly, power was purchased without reference to the variable cost and frequency. The Commission directed the Transmission Licensee to: (i) fix 0.2 accuracy class meters at the interface points, between generation company and transmission company and between transmission company and distribution company; (ii) conduct regular and thorough energy audits and furnish information in the format provided by the commission; and (iii) develop a comprehensive procedure for Merit Order dispatch in consultation with all stakeholders, and file it with the Commission for approval.

Agriculture Sector. There was often no metering in agriculture sector. Agriculture consumption was charged based on the capacity (in horsepower) of the pump set used—the higher the horsepower, the higher the tariff. There were about 2.3 million agricultural connections. Corruption could take place in recording the horsepower of the pump set. Based on a number of cases, the horsepower of the pump set was higher than what was incorporated in the records of the Licensee. There was collusion between the farmer and the lineman, or the farmer had upgraded the capacity clandestinely. Secondly, a large number of farmers were taking power without authorized connections. The Commission directed that billing should be based on the actual capacity of pump sets, and that unauthorized connections must be either regularized or disconnected and all new connections must have meters.

Domestic and Commercial Sectors. In the domestic and commercial sectors, theft arose from: (i) non-metering because of lack of meters, resulting in arbitrary assessment of consumption; (ii) tampering of meters (iii) incorrect recording of meter readings to keep the consumption at a lower level to escape billing at higher rates in a non-telescopic tariff system; (iv) ad hoc billing in case of stuck and faulty meters; (v) billing without reading meters; (vi) supply of power through fictitious connections bypassing the meter; (vii) supply of power without bringing it to utility records; (viii) having multiple meters in the same household or commercial establishment to keep the consumption at lower tariffs; (ix) continuing to supply power, although power supply was disconnected on record for nonpayment of bills; (x) billing made at a lower level than the actual meter reading in collusion with the billing staff; and (xi) some consumers used domestic premises for commercial use to pay the domestic tariff instead of the commercial rate.

Industrial Sector. Large-scale theft was taking place, especially in power-intensive industries—with and without collusion from the utility staff. Commercial incentives to steal electricity were high since industrial tariffs were very high because of cross-subsidization of the domestic and agricultural sectors. Theft involved (i) simple bypassing of the meter or tampering the meter to make it run slowly, (ii) tampering with the components within the meter to record lower consumption, (iii) manipulating the multiplication factor on the meter in cases of high power consumption industries (in collusion with the meter installer), and (iv) laying underground bypass cables. Solutions include demand meters for consumers with intermediate connected load; for high tension consumers, metering should be provided on the high tension side. There were also cases where industrial units had their own captive generation sets and a standby connection to supply of power from the Licensee. The Licensee was actually drawing power from the high tension connection, bypassing the meter without operating the captive generating set. Commissions are directing utilities to launch special drives to detect theft in all cases of industrial units with captive generation sets and intensify surprise checks in the industrial establishments with vigilance staff and remotely monitoring their consumption.

Source: Operations Evaluation Department ADB. 2007. *India Sector Assistance Program Evaluation on Energy*. (Forthcoming).

C. Investigation of ADB Energy Projects (1998–2006)

17. Despite the application of standard governance and anti-corruption requirements in the loan agreements for energy projects, some attempts to circumvent procurement processes were detected. As of July 2006, ADB's Integrity Division[7] had identified 49 cases involving energy projects with allegations of corruption. Of the 49 cases, 44 were loan projects and 5 were TA grants. The cases were spread among 11 DMCs (Table A5.5). Based on the investigations, these cases can be summarized as: (i) irregularities in the bid evaluation process, (ii) submission of falsified certificates of consultants and performance certificates of firms, (iii) procurement discrepancies and irregularities, (iv) collusion of consultants and contractors, (v) collusion in the bid process, (vi) corruption of officials in procurement and administrative matters, (vii) payoffs from participating firms to get the contract awards, and (viii) bribery. Allegations of corruption were the most prominent (37%) complaint, followed by charges on fraudulent practices (26%), misrepresentation (12%), abuse of position (6%), collusion (6%), bribery and extortion (4%), and others (8%) (Table A5.6).

Table A5.5: Allegations of Corruption in the Energy Sector
(as of 21 July 2006)

Country	No. of Cases	Percent (%)
Bangladesh	24	49
Cambodia	1	2
People's Republic of China	3	6
India	5	10
Lao People's Democratic Republic	1	2
Nepal	7	14
Pakistan	1	2
Philippines	1	2
Samoa	1	2
Sri Lanka	2	4
Tajikistan	3	6
Total	**49**	**99**

Source: Asian Development Bank. Office of the Auditor General, Integrity Division.

Table A5.6: Energy Projects Allegations of Corruption Case Category
(as of 21 July 2006)

Category	No. of Cases	Percent (%)
Corruption	18	37
Misrepresentation	6	12
Fraudulent Practices (other than misrepresentation)	13	27
Bribery/Extortion	2	4
Collusion	3	6
Abuse of Position	3	6
Others	4	8
Total	**49**	**100**

No. = number.
Source: Asian Development Bank. Office of the Auditor General, Integrity Division.

18. Investigations of 32 (out of the 49) cases were closed because (i) the allegations were found to be based more on the scope of contractual, procurement, and executing agency's

[7] Available: http://www.adb.org/Integrity

management capacity issues rather than fraud and corruption (15 cases); (ii) there was lack of credible evidence and information, or the concerns had no merit (11 cases); and (iii) allegations/issues had been dealt with by the respective departments/government (6 cases). The ADB Integrity Oversight Committee has sanctioned 10 project cases where fraud and corruption were proven. Summaries of specific actions taken are in Table A5.7.

Table A5.7: Synopsis of Confirmed Corruption Cases in ADB Energy Projects

Project No./Title	Year	Allegation	Anticorruption Sanctions by ADB Integrity Oversight Committee
Loan 1094-PAK: Second Oil and Gas Development Project	2000	Alleged procurement discrepancies	The firm in question was determined to have submitted falsified documents to manipulate the award of contract to a fictitious firm, signed the contract in behalf of the bidders, and collected payment. The equipment delivered was not in accordance with specifications. The firm was debarred for 5 years while the owner and manager were declared ineligible indefinitely.
Loan 1885-BAN: West Zone Power System Development Project	2003	A firm alleged that Firm A falsified its work experience in a previous contract in Nepal as part of a bid for the turnkey contract under the above project. Firm B misrepresented its work experience in its proposal for the project.	The certificate of work experience submitted by Firm A was fake, and the firm's internal investigation substantiated that an employee of its Bangladesh Office prepared and submitted the falsified document. The alleged misrepresentation of work experience by Firm B was actually a typographical error. Firm A's employee was sanctioned for 2 years. Further action was not taken with regard to Firm A. A strong warning letter was issued to Firm B indicating that such error will not be allowed in the future and may be interpreted as misrepresentation.
Loan 1730-BAN (SF): Dhaka Power System Upgrade Project	2003	Alleged submission of false performance certificates as well as certain "arrangement" with an official of the EA	The three performance certificates submitted were established to be fake. The firm claimed the certificate had been tampered by the EA and a competitor. Specific names were requested to allow further investigations but the firm never replied to further inquiries. Background checks did not establish any ties between the firm and the official referred to in the allegation. The firm was sanctioned for 7 years. Its appeal was also rejected because of lack of new information and resistance to disclose the names of the alleged perpetrators.
Loan 1732-NEP: Rural Electrification Distribution and Transmission Project	2004	Potential collusion: the submitted bids of the two bidders (joint ventures) contained similar information	The bid price information in both bids is similar and the name of the representative of one of the bidders was written in the price schedule page of the bid submitted by the other bidder. It was concluded that the two bidders collaborated with each other and shared confidential information prior to submission of their respective bids. A sanction period of 3 years was imposed on each of the lead firms of the two bidding joint ventures and their representatives.
Loan 1884-BAN (SF) and Loan 1885-BAN (SF)	2004	Potential collusion among three bidders: firms A, B, and C	The total and per line item prices, both in local and foreign amounts, quoted by the three firms were identical. The firms admitted quoting the same prices as they intended to jointly supply the materials under a de facto agreement, given the large requirement. A formal joint venture was not initiated because of lack of knowledge of the procedure. Two of the bidders declined to extend their respective bid bonds and their decline letters were verbatim. They claimed they could not extend

Project No./Title	Year	Allegation	Anticorruption Sanctions by ADB Integrity Oversight Committee
			their bid bonds because of an anticipated increase in material prices and disclosed to have discussed the bid security issue together and prepared a single letter. The three firms colluded when they prearranged to jointly supply the materials for the contract and submitted identical bid prices. A three-year sanction period was imposed on each of the three firms, considering that they cooperated during the investigation. The decision was appealed but rejected because of lack of new information to consider.
Loan 1885-BAN: West Zone Power System Development Project	2004	Submission of false performance certificate	Evidence was received that the firm submitted a falsified performance certificate. The firm did not respond to inquiries to seek clarifications. The firm was sanctioned for 7 years. No appeal was received.
Loan 1884-BAN (SF) and 1885-BAN:West Zone Power System Development Project	2004	Alleged submission of false performance certificate	The EA substantiated that the firm falsified its performance certificate. A finding letter was sent to the firm and a representative admitted he was responsible for falsification of the document. The firm is ultimately responsible for its representatives, directors, and officers when they act in behalf of the company. Both the firm and its erring representative were each sanctioned for 3 years.
TA 3552-NEP: Power Sector Reforms in Nepal	2004	Various allegations from the expert and two project officers: (i) according to a project officer, the expert misrepresented his availability when he signed the contract with ADB for subject TA; (ii) another project officer claimed the expert failed to return the advance payment of $552 and airline ticket of A$6,662 when he was terminated as a consultant; and (iii) the expert stated that the consulting firm did not pay his service fee of $US11,000.	The firm's nonpayment of service fee and expert's failure to return the advance payments are contractual issues which should be resolved between the expert and the firm. The allegation of misrepresentation was investigated and it was found that the expert did not inform ADB of his current engagement on another ADB project, causing delay for 1.5 months. The expert claimed he asked for a leave and thus thought that it would be okay but the Project Officer explained that such accommodation was done to minimize disruption in the project. There was no misunderstanding since the expert only asked for a leave and did not disclose his prior commitment on the other TA. The expert was sanctioned 3 years.
Loan 1817-TAJ (SF): Power Rehabilitation Project	2004	Submission of falsified financial information during the pre-qualification stage of the tender of the bidding for the contract	A joint venture consisting of two firms submitted an audit opinion for 3 years ending December 2003, but the financial information was for calendar year 2000, 2001, and 2002. The firms are United Sates based companies while the certifying auditor is based in Tajikistan. There was no reply to the letters to the firm. ADB attempted to reach the firm through the auditor and the resident mission but failed. The letters sent through the resident missions were not delivered, as the local couriers were not able to locate the firm's addresses. The joint venture firms were both sanctioned for 7 years. No appeal was received during the 90-day appeal period.
Loan 2039-BAN:	2005	Joint venture submitted	The certificate of the joint venture was falsified.

Project No./Title	Year	Allegation	Anticorruption Sanctions by ADB Integrity Oversight Committee
Power Sector Development Program		a false certificate of experience in its bid tender	Two of the five firms in the joint venture were subcontractors of the project in 1999 and both asserted the correctness of the information provided to the firm representing the joint venture. These two firms (firms A and B) along with two other firms (C and D) failed to review the bid submission. The representative firm admitted the wrongdoing. The representative firm was declared ineligible to participate in ADB-financed activity for 5 years, firms A and B for 3 years, and firms C and D for 1 year.

ADB = Asian Development Bank, BAN = Bangladesh, EA = executing agency, NEP = Nepal, No. = number, PAK = Pakistan, SF = special fund, TA = technical assistance, TAJ = Tajikistan.
Source: Asian Development Bank. Office of the Auditor General, Integrity Division.

ENERGY INITIATIVES LEADING TO ENERGY EFFICIENCY AND IMPROVED ENVIRONMENTAL IMPACTS

A. Introduction

1. Energy Efficiency initiatives promote reductions in greenhouse gas emissions hence these initiatives are directly related to improvements in the environment. The most effective mechanisms are demand-side and supply-side initiatives are discussed in more detail below. More recent ADB initiatives are outlined at the end of Appendix 6.

2. Supply-side energy efficiency projects refer to efficient energy generation, efficient transmission, and distribution networks. Typical demand-side energy efficiency projects include a full set of measures summarized by sector in Table A6. Most of the measures listed could be applicable in many sectors, depending on the specific activities and the usage of energy.

1. Applications of Energy Efficiency at the Supply and Demand Side

3. Most electricity generation plants in developing countries have a poor efficiency level. The electricity transmission and distribution networks are also the poorest in the world. In India, technical transmission and distribution losses were estimated at 22% in 2005. The improvements of energy use will take place at both generation plants and delivery systems (electric grid, hot water network) sides.

a. Supply-Side Energy Efficiency Applications at Generation Plants

4. Energy at the supply side can be either electricity or heat. The primary sources are oil, natural gas, coal, and hydro. Energy generation plants considered here are any centralized systems that deliver end-use energy (electricity or heat) to consumers. For plants transforming the thermal contents of primary resources in end-use energy, energy efficient measures could include:

(i) fuel switching (natural gas/biomass instead of oil or coal);
(ii) renewable energy (biomass);
(iii) plant upgrading;
(iv) cogeneration;
(v) replacement of old equipment or plant by new efficient technologies (efficient boilers, efficient combustion control, etc.);
(vi) heat recovery (condensing water, waste gases);
(vii) steam systems (leaks control);
(viii) geothermal energy; and
(ix) efficient high voltage transformers and power factor correction (capacitor bank).

b. Supply-Side Energy Efficiency Applications in Energy Transportation and Distribution Networks

5. Transmission and distribution improvement measures aim to reduce energy losses between the generation plant and end users. In the electricity network, current measures consist of upgrading the voltage on transmission lines, installing capacitors in specific lines, and using more efficient transformers. Thermal energy distribution systems are applied in urban heating. Common actions target heat loss reduction through efficient insulation of the piping system, best

return lines, leak elimination, and trap maintenance. Energy can also be saved through better design of the distribution network (pipe sizing, network length reduction with few zone boilers instead of one large capacity boiler).

6. The following table outlines demand-side measures which are capable of reducing the overall energy consumption across for instance, commercial, industrial, and domestic sectors.

Table A6: Application of Energy Efficiency at the Demand Side

Sector	Applications/Technologies
Industry	• Combined heat and power systems (cogeneration) • Waste heat/gas recovery for electricity generation or process heat • Motors equipped with controllers and variable speed drives[a] • Steam systems: insulating steam and condensate return lines, stopping any steam leaks, and maintaining steam traps • Compressed air systems: variable-speed drives, stopping leaks, efficient nozzles • Combustion: high performance furnaces and boilers, combustion control • Absorption chillers: waste heat recovery or natural gas-fired machines • Process change: from “wet” to “dry” process (in cement industry) • Lighting: improve design; new technology (tri-phosphor fluorescents, high pressure sodium); control (timers, sensors); skylights • Energy management
Commercial and Residential Buildings	• Improvement of buildings envelope (insulation, shading, efficient windows and doors, etc.) • Lighting systems improvements (low consumption lamps, compact fluorescent lamps, electronic ballasts, skylights, control) • Appliance efficiency: through star ratings and minimum standards • Heating and cooling system (ice storage, upgrading boiler, insulation of ducts, free cooling) • Absorption chillers: waste heat, solar or natural gas-fired machines • Control improvements • Energy efficient motors and variable-speed drives • Energy efficient electronic goods (computers, photocopiers, etc.) • Cogeneration • Heat recovery • Fuel switching (natural gas for oil or use of biomass) • Renewable energy (solar hot water, photovoltaic, geothermal heat pump) • Hot water heat pump or wastewater heat exchange • New-build passive design (zero or low energy houses)
Agricultural	• Motors: efficient motors and pumps, variable speed drives for pumps • Improvements of irrigation systems: water management, stopping water leaks, maintaining water traps, waterway resizing • Efficient lighting system • Waste treatment system • Fuel switch: biomass, biogas • Efficient vehicles and machinery: top-runner standard tractor, low fuel consumption, bio-carburant, etc. • Renewable energy: solar hot water, photovoltaic, geothermal
Transportation	• Development of clean energy motor vehicles • Energy conservation measures for traffic systems • Accelerated introduction of cars acceptable to the top-runner standard • Fuel switch for vehicles: hybrid, natural gas, or biofuel (bio-diesel, ethanol) models • Technical improvements in electronic engine controls • Demand-actuated cooling fans • Intercoolers • Low-profile radial tires

Sector	Applications/Technologies
	• Multiple trailers
Utility DSM Programs	• Conservation programs: reduce energy use, e.g., programs to improve the efficiency of equipment (e.g., lighting and motors); buildings; and industrial processes • Load management programs: redistribute energy demand to spread it more evenly throughout the day, e.g., load shifting programs (reducing air conditioning loads during periods of peak demand and shifting these loads to less critical periods), time-of-use rates (charging more for electricity during periods of peak demand), and interruptible rates (providing rate discounts in exchange for the right to reduce customers' electricity allocation during the few hours each year with the highest electricity demand) • Strategic load growth programs: increase energy use during some periods, e.g., programs that encourage cost-effective electrical technologies which operate primarily during periods of low electricity demand
Standard and Label Programs	• Energy-efficiency labels affixed to manufactured products describe the product's energy performance (energy use, efficiency, energy cost), giving consumers the data necessary to make informed purchases • Energy-efficiency standards are procedures and regulations that prescribe the energy performance of manufactured products, sometimes prohibiting the sale of products that are less efficient than a minimum level • The most commonly labelled appliances are refrigerators, freezers, and air conditioners, although the range is as diverse as rice cookers, boilers, lighting products, and washing machines • Labelling and standards programs aim to transform energy-efficient products market by progressively removing inefficient devices from the market through awareness campaigns, incentives, taxes rebates, and mandatory prescriptions

[a] Motor-driven equipment accounts for 64% of the electricity consumed by US industries, and the related energy savings are estimated to be at least 12%.

DSM = demand-side management.

Source: Econoler International.

2. New Initiatives

7. Consistent with the 2000 Review, ADB has launched several new initiatives that should allow it to play a greater role in promoting clean energy. These include the Carbon Market Initiative, the Energy Efficiency Initiative, the Asia Clean Energy Fund, and the China Environment Fund.

8. The Carbon Market Initiative was approved in November 2006[1] and is intended to deepen ADB's commitment to clean energy and climate change mitigation. It will provide financial and technical support to developers and sponsors of projects with greenhouse gas mitigation benefits that can quality as an eligible Clean Development Mechanism project under the Kyoto Protocol. As part of this initiative, the Asia Pacific Carbon Fund, a trust fund established and managed by ADB on behalf of fund participants, will provide up-front funding against the purchase of an estimated 25%–50% of future carbon credits expected from projects. In addition, the initiative will provide grant-based technical support for preparation and implementation of eligible projects as well as marketing support for additional carbon credits.

9. The Energy Efficiency Initiative (EEI),[2] is a cohesive approach for ADB to expand its EE investments, with an indicative annual lending target of $1 billion between 2008 and 2010. The medium term investment and action plan will refine and break down this investment target using bottom-up analyses of key sectors in the high energy consuming DMCs. It will also define the

[1] Participants who so far have agreed to put in a total of $85 million into the fund include Luxembourg, Spain, Sweden, and Switzerland. Other countries have expressed intent to come in before the fund's deadline for investment at the end of June 2007, by which time total committed funds are expected to exceed $120 million.

[2] ADB. 2006. *Report of The Energy Efficiency Initiative.* Manila.

operational plans to implement replicable energy efficient investments and proven development models in the period from 2008 to 2010. In the decade 2010–2019, when the DMCs are projected to have even higher energy consumption, ADB will have the appropriate tools and instruments to scale up EE investment commensurate with the challenge**.**

10. As part of the EEI, the $ 250 million Clean Energy Financing Partnership Facility, approved by ADB in April 2007, is designed to finance (i) smaller energy efficiency investments that require quick and efficient transactions; (ii) technology transfer costs of clean technologies for a small number of high demonstration impact, large interventions that will catalyze deployment of clean energy technologies; and, (iii) grant assistance for activities such as developing the knowledge base and incentive mechanisms, advocacy, institutional capacity building, project preparation, and establishment of the monitoring and evaluation mechanisms.

11. Other initiatives to target renewable energy and energy efficiency projects include equity fund investments in the Asia Clean Energy Fund ($20 million, 2003) and the China Environment Fund ($10 million, 2002).

12. In addition to the above, ADB is establishing regional knowledge hubs to support and strengthen regional capacity to generate innovative concepts, science, technology, and management development on clean energy. Three knowledge hubs have been established: (i) The Energy Research Institute in New Delhi for Clean Energy, (ii) Tsinghua University in Beijing for Climate Change, and (iii) the Asian Institute of Technology in Bangkok for the 3Rs (reduce, reuse and recycle).

TIME-OF-USE PRICING: APPLICATION OF LONG-RUN MARGINAL COST PRICING TO GENERATION AND CONSUMERS

1. Common to electricity sectors reviewed in all developing member countries (DMCs) is the need for them to become more self-sustaining through the introduction of tariffs, which recover the total long-run cost of the industry, reduce subsidies, remove cross-subsidies within and across tariffs, and reduce the risk of volatile or rapidly increasing tariffs through the introduction of better risk management policies and procedures.

2. The cost of electricity supply has increased dramatically during the past decade, and tariff increases have severely lagged behind the cost of supply.[1] Major sources of tariff increases have come about from the Asian financial crisis and large devaluations of DMC currencies, and the effect of foreign-denominated loans in the electricity sector. Additionally, some of the power purchase agreements (PPAs) undertaken by DMCs were above market costs. More recently, fuel prices have been very volatile, and their inclusion in automatic increases in tariffs makes tariffs very volatile.

A. Recovery of Full Costs of Supply

3. Tariffs are often highly politicized, and while decisions about them continue to be made in the political arena, the electricity industry is often forced to cut maintenance and reduce system expansion,[2] finally leading to lower service standards and a reduction in the competitive capacity of industry and commerce. Tariffs which recover the "best practice" total long-run marginal costs (LRMCs)[3] of supplying electricity ensure the long-term viability of the electricity sector. In Viet Nam and Indonesia, tariffs approach "best practice" LRMC of delivery. However, electricity tariffs in a number of other DMCs are well below their LRMC. This continues to be a major deterrent to new investment.

B. Removal of Subsidies and Cross-Subsidies

4. Subsidies can occur through direct funding, and cross-subsidies between consumer classes and between services such as transmission and generation. Some sectors, particularly the very poor rural consumers, cannot afford either the cost of connections or a tariff based on a LRMC and rely on lifeline rates (cross-subsidies) or direct subsidies. Subsidies are "addictive", like taxes: once they are implemented, politicians are very reluctant to remove them. While there are ample opportunities to make these subsidies transparent, the use of cross-subsidies is more difficult to monitor, as the subsidies are hidden.

5. Subsidies for rural electrification and the provision of electricity to the very poor provides major social benefits, but a recurring concern expressed in the evaluation of Asian Development Bank (ADB) lending programs is the treatment of subsidies and cross-subsidies for these people. The major concern is that, by giving subsidies at the onset without a clear program to

[1] The two key reasons for the substantial increases in cost of supply were: (i) the Asian financial crisis (severely impacting Indonesia, Lao PDR, Philippines, and Thailand); and (ii) less than prudent power purchase agreements (PPAs) signed with independent power producers (IPPs) (Indonesia, Pakistan, and Philippines). Inability to adjust tariffs to fully cover such cost increases led to insolvency of the utilities in Indonesia, Lao PDR, Pakistan, and Philippines (National Power Corporation), and to near insolvency of EGAT (Electricity Generation Authority) in Thailand.

[2] For instance, generation tariffs in Mindanao, Philippines are well below the marginal cost of fuel. This will deter private sector entry into the system, which is now at the peak of its capacity.

[3] For hydro projects, the long-run marginal cost should be taken as the actual costs on each system is unique.

reduce them, expectations of continuous low costs will arise. These have hampered full cost recovery across the borrowers. Subsequently, this impairs their service delivery and their ability to service loans. Subsidies may still be necessary, but they should be made as transparent as possible; budgeted for under separate (e.g., government) provisions; and have a well-publicized time frame for gradual withdrawal. Gradual, even monthly, increases of tariffs to full cost recovery levels have been accepted in several of the DMCs for example in Bangladesh, consumers have indicated a willingness to pay increased rates for more reliable supply. Additionally, commercial lending institutions are withholding funds to DMCs where tariffs are perceived to be significantly below the LRMC, preventing the entry of the private sector and competition in the electricity sector. Thus, ADB should continue to use DMC lending covenants to increase tariffs.

(i) Intra-sector subsidies between profitable and unprofitable components of supply can be exposed through unbundling. This assists in the regulation of the components and possible future market restructuring.

(ii) Introducing time-of-use (TOU) tariffs removes cross-subsidies between customer segments, promotes the use of demand-side management, and creates further efficiency in the use of transmission and distribution facilities. TOU tariffs also signal the true cost of production and delivery of energy, and provide cost signals for the supply of appropriate infrastructure to meet needs at particular times.[4] TOU prices should promote more efficient use of energy infrastructure and should result in lower tariffs for consumers.

C. Time-of-Use Pricing

6. TOU pricing at the wholesale level provides the generation sector with clear cost signals, and allows them to recover their full LRMCs while maintaining a correct mix of plant in the system. At the retail level, passing the actual cost of consumption on to consumers removes cross-subsidies, which are inherent in flat rates. TOU signals the actual cost of supply, and encourages demand-side adjustments which promote more efficient use of transmission and distribution assets.

1. Generation Effects of TOU

7. There is a very large difference in marginal production costs between peak and off-peak generation. Off-peak generation is usually supplied by geothermal and coal-fired stations, with a marginal cost of around $17 per megawatt-hour (MWh), whereas peak energy marginal costs range from $60 per MWh (for gas-fired combined cycles) to $100 per MWh (for diesel-fired gas turbines).

8. To maintain a balance of generation plant supplying base, intermediate, and peaking loads—and because generation plants may not be part of a portfolio—it will be necessary to price energy so that each type of plant can recover its individual total LRMC. A single (average) price which enables a peak load plant to recover all costs (say $100) will give base load producers unnecessary profits. Conversely, average prices set at the LRMC of base loads (almost $40) will not ensure that peak generation plant will be dispatched, as these prices are uneconomic for peak load plants. Thus, single pricing may induce immediate shortages of supply.[5]

[4] For instance, peaking prices should cover the long-run marginal cost of a peaking plant.

[5] A single (average) price discourages the building or sale of peaking assets in the event of increased private participation.

2. Base Load Plant

9. For discussion purposes, it is assumed that base load plant will typically be coal fired. Coal-fired plants have the property that they take some considerable time to start-up and shutdown. As such, it is desirable that once started this plant runs continuously throughout the year until a routine maintenance cycle requires the system to shut down. The operation of this plant requires the continuous feed of coal from the fuel sources available, and the continuous removal of ash from the boiler system. The plant is typically dispatched to deliver about 50% (at off peak) to 100% of its rated output at system peak.

3. Midrange Plant

10. This plant is characterized by its ability to move between approximately 30% and 100% of its rated output power. While it will often be shut down within a 24-hour period, it is less expensive to remain online at low output rather than having to cycle down and up. This minimizes wear and tear and allows rapid response to step changes in plant availability, bolstering network system reliability. In most instances, this plant is gas fired but a dual-fired gas/coal plant is also used in this format. The plant capacity factor is lower, at around 30–50%.

4. Peak-Load Plant

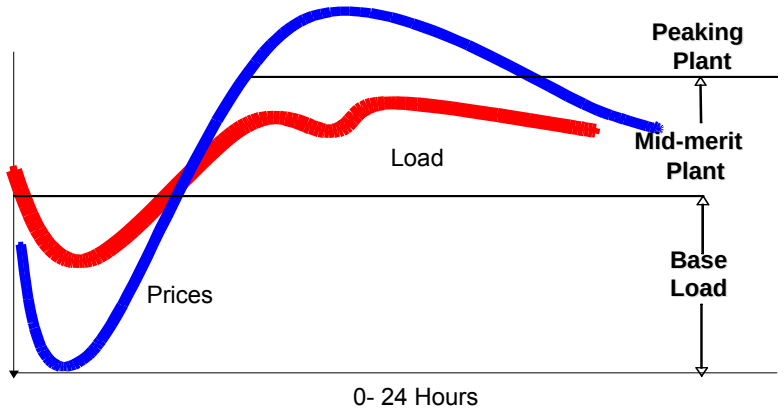
11. These generators are characterized by the capability for a rapid start-up and shutdown cycle (i.e., less than 1 hour). These plants are typically gas-fired, single-cycle turbines and usually do not run continuously during the day. In fact, many are only fired up for the peak periods of demand during the daily load profile. The plant capacity factor is also usually low, typically 10–20%.

D. Generator Cost Profile

12. The characteristics of each plant lead to a typical cost (or in the case of a market, bid stack) profile. As depicted in Figure A7.1, the coal-fired plant usually runs 24 hours per day as it has both the largest power output and best economies of scale. During the very low demand periods early in the morning, the plant is run at reduced output levels. The mid-range plant, while usually being turned off during low-demand periods, will fire up for the remainder of the day. Its operating profile tends to provide fewer economies of scale; hence a higher price is required to recover costs than base load plants. A peak-load plant is typically the most costly plant to operate, but can be brought online very rapidly.

13. During each half hour period, the system operator dispatches the generation plant from the lowest cost through to the highest required to provide the forecast half-hourly demand of the system. This sets the half-hour cost at the highest cost plant which has been dispatched—the “dispatch price” (or tariff). All plants receive the dispatch price for that half-hour period. The different revenues over time recover the total costs of each plant.

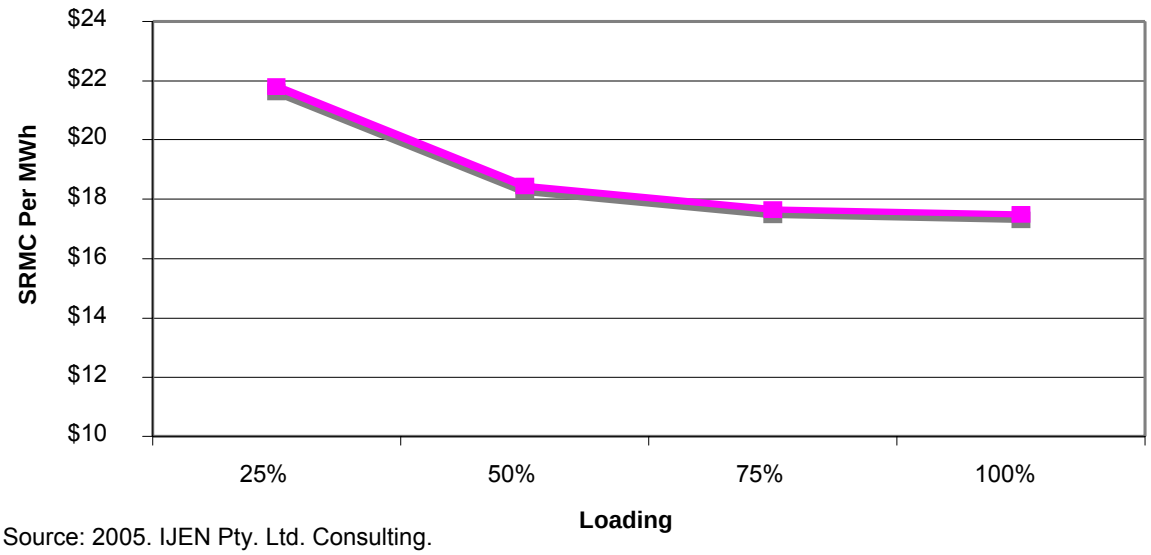
Figure A7.1: Generator Load and Price Profiles



Source: 2005. IJEN Pty. Ltd. Consulting.

14. Off-peak prices are low and off-peak generation units often run at low capacities, incurring a further cost penalty as the generation efficiency is reduced with lower loads. Hence, it is highly desirable for the base load generation to increase capacity factors during off-peak periods. Figure A7.2 indicates the reduction in costs per kilowatt-hour (kWh) as the plant loading is increased from 25% to 100% for a coal-fired plant. This provides strong incentives for base load generators to offer additional load at near peak loading short-run marginal cost (SRMC) prices.

Figure A7.2: Short-Run Marginal Cost Price of Base Load Plant under Different Loads

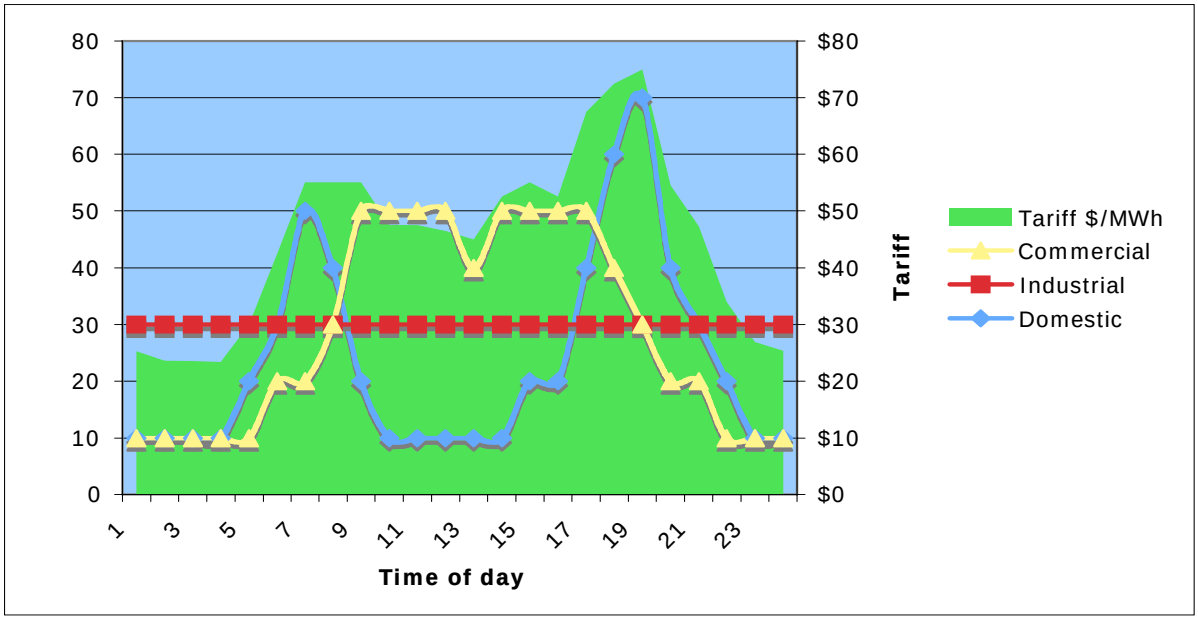


Source: 2005. IJEN Pty. Ltd. Consulting.

E. Consumer Effects

15. TOU pricing removes the cross-subsidies between consumer groups, as those with the majority of consumption at peak periods (hotels and domestic consumers in particular) will not be subsidized by off-peak loads. Figure A7.3 depicts typical load shapes for customer classes. It shows that domestic consumers use most energy at the system peak, followed by commercial customers, whereas industrial customers have constant loads and are not responsible for the "spikes" in demand. A flat tariff penalizes efficient users. In Figure A7.3, the real tariffs of domestic consumers should be about 18–20% above the average tariff paid by commercial users, and those of commercial consumers should be about 12–15% higher than the commercial user rate. Thus, TOU pricing reduces cross-subsidies imposed by average tariffs.

Figure A7.3: Example of Customer Class Loads and Time-of-Use Costs



Source: IJEN Pty. Ltd. Consulting.

16. TOU pricing provides a signal to consumers about the cost of consumption. TOU pricing will assist customers in the transition to full competition in a deregulated market, in that the cost of energy will more closely reflect production costs and alert customers to the risk of under-contracting at peak times.[6] In a deregulated market, plants are unlikely to bid at prices below their SRMC, so pool prices will reflect actual, rather than average, costs of production.

17. Pricing also encourages efficient use of transmission and distribution facilities, as the demand shifts to take into account the pricing signals provided by generation. Flatter loads require less capacity in the transmission system and reduce line losses (these increase as the square of the load), thereby reducing the cost of the transmission system and the delivered cost of energy.

[6] For instance, existing flat prices in the Philippines permit customers to buy all energy at a single price without regard to production costs. As a result, distribution utilities are generally under contract for their needs as they are able to buy any additional power at fixed prices. In this scenario, the utility with a peaking plant bears the risk of additional loads with a single pricing regime.

REGIONAL COOPERATION

1. The 1995 Energy Policy of the Asian Development Bank (ADB) identified ADB's role as a catalyst in regional cooperation by (i) providing information to developing member countries (DMCs), (ii) facilitating dialogue and participation, and (iii) assisting in the mobilization of public and private sector resources to finance regional cooperation activities. ADB initially adopted a phased approach in supporting regional cooperation where ADB aimed to finance or help mobilize finance for (i) regional projects that carried a strong economic rationale, (ii) national projects with regional implications, or (iii) projects that called for complementary investment by neighboring DMCs. Opportunities identified for regional cooperation included agreements and complementary investments for equitable exploitation of common hydropower potential, and petroleum resources and inter-country transmission of energy supplies. The regional cooperation policy was later revised and a Regional Cooperation and Integration Strategy (RCIS) was adopted in July 2006.[1] The RCIS broadened the scope of regional economic cooperation by spelling out ADB's role in trade and investment cooperation and economic integration, including: (i) support to regional and subregional trade and investment promotion by playing a facilitating role in policy dialogue; (ii) capacity and institutional development for DMCs on issues related to free trade agreements and trade facilitation; (iii) research and information dissemination, including support for establishing a database on free trade agreements in the Asia and Pacific region; and (iv) building stronger partnerships with other stakeholders and institutions that support RCIS.

2. ADB has initiated or supported six programs to promote regional cooperation in the region:

(i) Greater Mekong Subregion (GMS) program, which the Mekong River passes through, comprising Cambodia, Lao People's Democratic Republic (Lao PDR), Myanmar, Thailand, Viet Nam, and Yunnan Province and Guanxi Province of the People's Republic of China (PRC)
(ii) Brunei Darussalam Indonesia Malaysia the Philippines East Asean Growth Area (BIMP-EAGA) program
(iii) South Asia Subregional Economic Cooperation (SASEC) program
(iv) Central Asia Regional Economic Cooperation (CAREC) program
(v) Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT) program
(vi) Cooperation between Mongolia and the PRC.

3. Under the GMS program, cooperation in energy focuses on the development of the regional power market and power trade arrangements. This involves a two-pronged approach consisting of (i) providing the policy and institutional framework for promoting opportunities for extended cooperation in regional power trade; and (ii) using a building block approach to realize essential grid interconnection infrastructure that will physically allow the cross-border dispatch of power. The rationale for promoting regional power trade arises from the fact that, while the GMS region is well-endowed with diverse energy resources to feed the growing demand for electricity, the geographic distribution of these resources is uneven. Power trade can help secure a better balance in the subregion's energy supplies.

4. Enhanced energy connectivity is being steadily achieved under the GMS program through construction of cross-border power transmission lines. Initially, these lines fulfill bilateral but one-way trade arrangements, e.g., export of power from specific hydropower projects in a

[1] ADB. 2006. *Regional Cooperation and Integration Strategy.* Manila

surplus country to the grid system of a power-deficient country. Even this limited power trade currently taking place in the GMS has generated substantial benefits to parties involved—Lao PDR's export of hydropower to Thailand helped boost its foreign exchange earnings for its development programs while helping meet its projected power demand, expected to grow in excess of 7% per annum through 2020. Thailand, on the other hand, gained access to a low-cost energy source.

5. ADB approved the GMS Transmission Project[2] for Cambodia in November 2003. The total cost of the project is $95 million, of which ADB financing is for $44.3 million, World Bank financing is for $16 million, Nordic Development Fund financing is for $11 million, and the Government of Cambodia will finance the balance of $23.7 million. The project's aim is to provide sustainable and reliable supply of electricity to consumers in Phnom Penh and to those living along the route of the transmission line. This will be done by importing up to 1,490 gigawatt-hours (GWh) of electricity from Viet Nam by constructing a 230 kilovolt (kV) transmission line from the Viet Nam border to Phnom Penh via Takeo. The border price of electricity will average $0.06/kWh. The delivered electricity price to medium voltage system in Phnom Penh will be about $0.078/kWh, which includes losses, operation and maintenance, and all taxes. The electricity from Viet Nam will provide a sustainable and reliable supply at a lower cost than any alternative currently available in the country and will improve Electricity Du Cambodia's (EDC) financial position, and eventually ease pressure for tariff increases. Electricity will also be supplied to Takeo Township and to rural villages and communities living close to the transmission line that are currently not served. Bidding for the construction of the towers commenced in June 2006 and the bids are to be awarded shortly. The transmission line is envisaged to be commissioned by the end of 2008.

6. The Second Power Transmission and Distribution Project[3] was approved in September 2006. The total project cost is $52 million, of which ADB will provide financing for $20 million, Japan Bank for International Cooperation will finance $22 million, and the Government of Cambodia will provide the balance of $10 million. The project will (i) extend the 230 kV power grid from Kampot to Sihanoukville and provide reliable electricity supply at affordable prices to consumers in Sihanoukville and adjacent areas along the transmission corridor, (ii) increase connections, (iii) stimulate economic growth in the southern economic corridor, and (iv) improve EDC's operational efficiency and performance through institutional development and capacity building.

7. Currently, the EDC tariff in Sihanoukville ranges from $0.13/kWh to $0.20/kWh. In rural towns, the rural electric enterprises supply electricity at tariffs as high as $0.38/kWh–$0.68/kWh. Through the project, electricity from Viet Nam will have a delivered price in Sihanoukville of around $0.08/kWh, including losses, operation and maintenance, and all taxes. This will greatly ease the burden of consumers by enabling them to use the savings for other purposes (education, health, or business); and promote sustainable economic development. Rural villages and communities close to the transmission line that are currently not served will also be supplied with electricity.

8. Eventually, the aim is for grid-to-grid interconnection involving two or more countries that will enable multiparty trading of power and therefore more efficient power markets in the long run. To achieve this, the GMS countries agreed that a gradual approach should be undertaken,

[2] ADB. 2003. *Loan (2502) to Cambodia on GMS Transmission Project*. Manila.
[3] ADB. 2006. *Report and Recommendation of the President to the Board of Directors for a Proposed Loan to Cambodia for Second Power Transmission Project.* Manila.

moving from stage 0 (one-way trade) to stage 1 (bilateral, two-way trade) then to stage 4 (competitive, multiparty trade). To facilitate the market's evolution, the GMS program worked to strengthen the policy and institutional framework for power trade. A major step was taken when the GMS countries signed the *Inter-Governmental Agreement on Regional Power Trade* during the First GMS Summit in 2002, which sets the long-term vision and objective for the regional power market. The Inter-Governmental Agreement also provided for the Regional Power Trade Coordination Committee (RPTCC), established in 2004, to coordinate with and represent the GMS countries involved in regional power trade. The RPTCC, with the help of its subgroups (focal group and planning working group) is currently developing the Regional Power Trade Operating Agreement, which will prescribe the operating guidelines for power trade. At the Second GMS Summit in July 2005, the GMS countries signed a memorandum of understanding on the *Guidelines for the Implementation of the Regional Power Trade Operating Agreement Stage 1,* which sets rules for initial trade at Stage 1.

9. Current RPTCC activities cover the conduct of priority studies (performance standards, transmission regulation); capacity building; power master planning; database development; and preparation of best practices (a "how-to manual") for power purchase agreements (PPAs). These are all directed toward: (i) facilitating the preparation of cross-border transmission projects needed for power trade by removing or minimizing the financial, economic, and technical bottlenecks in building such lines; and (ii) equipping the GMS member countries with the capacity to plan, regulate, secure, and operate a power market where power trade takes place more regularly. A more competitive regional power market will result in: (i) reduced need for investments in power reserves to meet peak demand, (ii) more reliable supply, (iii) reduced operational costs, and (iv) enhanced consumers' access to the cheapest power sources available. The earlier stages of GMS power trade could be based on export of hydropower to Thailand and Viet Nam from the rest of the GMS, which brings the added advantage of reducing greenhouse gas emissions and other pollutants. However, other energy sources abundant in the GMS (coal, gas, renewables) could eventually be tapped for the regional power market to ensure against risk of energy shortfall caused by climactic changes. In summary, through regional power trade, GMS countries will be able to rely on more economically favorable energy resources, thus enhancing the efficiency and competitiveness of their economies.

10. The following tables summarize lending and TA assistance for regional cooperation.

Table A8.1: Energy Projects Promoting Regional Cooperation in the Greater Mekong Subregion
(1994–2005)

Loan No.	Country	Project Name	Year of Approval	Approved Amount ($ million)
1329	LAO	Theun Hinboun Hydropower	1994	270.0
1456	LAO	Nam Leuk Hydropower Development	1996	112.6
2052	CAM	Cambodia: GMS Transmission Project	2003	95.0
2162	LAO	Nam Theun 2 Hydroelectric Project	2005	1,250.0

CAM = Cambodia, GMS = Greater Mekong Subregion, LAO = Lao People's Democratic Republic.
Source: Asian Development Bank database.

Table A8.2: Technical Assistance Promoting Regional Cooperation in the CAREC and GMS
(1996–2006)

TA No.	Project Name	Year of Approval	Approved Amount ($'000)
Greater Mekong Subregion			
5643	Subregional Electric Power Forum - GMS	1995	78.0
5697	Se Kong-Se San and Nam Theun River Basins Hydropower Development Study	1996	2,500.0
5920	Regional Indicative Master Plan on Power Interconnection in the Greater Mekong Subregion	2000	900.0
6100	Regional Power Trade Operating Agreement in the GMS	2003	850.0
6147	Preparing the GMS Power Interconnection Project Phase I	2003	800.0
4323	Preparing the Greater Mekong Subregion: Nam Theun 2 Hydropower Development Project - Phase II	2004	1,000.0
6301	Developing the Greater Mekong Subregion Energy Sector Strategy	2006	900.0
6304	GMS Regional Power Trade Coordination and Development	2006	1,200.0
Central Asia			
5663	Kyrgyz Republic and Xinjiang Yugur Autonomous Region	1996	360.0
5960	Preparing the Regional Power Transmission Modernization Project in the Central Asian Republics	2000	900.0
6023	Regional Gas Transmission Project in the CARS	2002	900.0
3956	Hydropower Development Strategy (Tajikistan)	2002	600.0
6163	Improved Management of Shared Water Resources in Central Asia	2003	700.0
4596	Preparing the Power Rehabilitation Phase II Project (Tajikistan)	2005	500.0
6267	Establishment of the CAREC Members Electricity Regulators Forum	2005	500.0

CAREC = Central Asian Regional Economic Cooperation, CARS = Central Asian Republics, GMS = Greater Mekong Subregion, TA = technical assistance.
Source: Asian Development Bank database. See also Appendix 1.

COMPARISON OF ENERGY POLICIES AND OPERATIONAL STRATEGY OF VARIOUS FUNDING AGENCIES

Operational Priority	ADB Energy Policy	World Bank Energy Policy	United Nations Energy Policy	JBIC Energy Policy
A. Poverty Reduction	The energy sector operations of the Asian Development Bank (ADB) will be aligned with the three pillars of its poverty reduction strategy. Energy projects will be formulated and designed to support pro-poor growth and, to the extent possible, contribute to ADB's goal of devoting no less than 40% of its public sector lending to poverty intervention.	Improve access of the poor to modern energy services by reducing the cost and improving the quality of energy supplied to low-income households and social services, and ensuring that energy subsidies are targeted at and reach the poor.	Access to clean and affordable energy is a key requirement to increase agricultural productivity, achieve food security, and improve rural livelihoods.	Support for economic and social development in developing countries. The Japan Bank for International Cooperation (JBIC) aims to contribute to raising income standards and improving quality of life to achieve a self-sustainable economy, and to reducing the proportion of people living in poverty, through support for sustainable growth of developing economies.
1. Rural Electrification	ADB will help its developing member countries (DMCs) provide more regions and new consumers with access to electricity. Projects will be designed either as stand-alone electrification projects for increasing access, or where possible integrated rural development projects where electricity supply will complement development and poverty reduction efforts in other sectors such as agriculture, public health, education, rural development, and forestry.	The Global Environment Fund (GEF) is playing a key role in the design of comprehensive rural electrification programs that involve both traditional grid-extension approaches as well as innovative off-grid approaches. GEF has three implementing agencies: United Nations Development Program (UNDP), United Nations Environment Program (UNEP), and the World Bank.	Subsidize capital costs for rural grid electrification and develop off-grid solutions for providing energy services.	

Operational Priority	ADB Energy Policy	World Bank Energy Policy	United Nations Energy Policy	JBIC Energy Policy
2. Rural Energy Services	Rural expansion of energy supply needs to be timed to coincide with the implementation of integrated rural development projects covering water supply, irrigation, farm-to-market roads, sanitation and sewerage, agricultural processing facilities, and public health and education facilities, so that the synergy among these activities stimulates economic growth and reduces poverty while increasing the demand for energy and improving load factors.	The Bank has been at the forefront of international support on energy access and poverty since the 1996 publication of its rural energy strategy. The Bank's program on energy access and poverty provides for direct lending for provision of energy services and modern fuels to unserved households and enterprises, through: (i) grid extension programs, (ii) off-grid renewable solutions, (iii) improved fuels for cooking, (iv) parallel support for productive uses of energy, and (v) innovative financing mechanisms such as output-based assistance approaches.	The poor obtain energy services by gaining access to modern fuels, electricity, and mechanical power. This access is particularly important for women and girls since they are often the most affected by inadequate energy services. UNDP's activities to promote access to rural energy services focus on meeting people's cooking and heating needs, and providing electricity and mechanical power for household and productive uses.	
B. Promoting Private Sector Involvement	ADB will encourage market-based mechanisms to attract private expertise and investment for decentralized energy options, and will help identify appropriate forms of private sector participation and develop the necessary regulatory environment.	Energy sector policy reform is urgently needed to stimulate the investments needed for developing and transition economies to meet their energy needs. Much of the investment need is unmet because of policy constraints: addressing these problems through joint public and private participation, and working across the spectrum of public and private interventions, are required.		

Operational Priority	ADB Energy Policy	World Bank Energy Policy	United Nations Energy Policy	JBIC Energy Policy
1. Private Sector Participation	ADB will strongly encourage private sector participation in energy sector operations in its DMCs by helping create enabling environment, prepare projects suitable for such participation, and selects sponsors through international competitive bidding (ICB), and if necessary, to catalyze other financing sources by providing direct assistance to the sponsors.	Promote good governance and private sector development by divesting assets to strategic investors in a socially responsible and corruption-free way, catalyzing private investments by liberalizing entry to energy markets, and strengthening the voice of consumers and communities, thus improving the investment climate for clean energy. The Bank will aggressively pursue the commercialization and corporatization of, and private sector participation in, developing country power sectors. The Bank will also use some of its financial resources to support programs that will facilitate the involvement of private investors.		
2. Sector Restructuring	ADB will help its DMCs restructure the energy subsectors by unbundling existing entities and establishing competition where possible. The assistance will help DMCs in formulating energy sector policies and enacting related laws.	Establishment of a credible legal and regulatory framework that provides the stability on rules and prices that will induce investments into financially viable products. The failure to reform the energy sector limits access to finance.	Reforms to energy markets should focus on removing obstacles to efficient functioning of these markets. These reforms include providing for efficient entry and exit to these markets for energy suppliers and users, eliminating restrictions or bottlenecks on the import and distribution of modern fuels and electricity, removing market distortions that unfairly favor one supply source over another, and pricing energy to cover the cost of both operations and investments incurred in the delivery of energy services.	

Operational Priority	ADB Energy Policy	World Bank Energy Policy	United Nations Energy Policy	JBIC Energy Policy
3. Social Development	The social impact of projects and programs proposed for ADB assistance will continue to be analyzed, and recommended measures will be incorporated in design according to the relevant ADB guidelines. In line with the poverty reduction goal, particular emphasis will be given to analyzing the impacts of energy projects on poverty reduction.			In order to raise the quality of life of the poor, JBIC will place emphasis on the kind of infrastructure assistance that improves the quality of life of the poor by focusing its efforts on direct assistance to education and healthcare while taking into consideration infrastructure networks, such as transportation, communication, electricity, power, and water.
4. Subsidies	ADB will encourage DMCs to withdraw subsidies in the production and use of all energy products. However, recognizing the need of the poor and the possible recessionary impact of price increases, transparent and well-directed subsidies will be considered, when appropriate, over the short and medium term.	Subsidies for energy producers and consumers can become a large drain on the government budgets. Removal of broad-based subsidies, currently estimated to exceed $250 billion per year for all energy products, reflect the true cost of energy supply.	Well-targeted subsidy and taxation policies are needed to help bring affordable energy services to the poor and to enhance their energy security.	
5. Energy Pricing	ADB's approach to energy pricing evolved in the context of energy supply entities being in the public sector, organized as vertically integrated utilities and subjected to administered pricing regimes.		Pricing energy to cover the cost of both operations and investments incurred in the delivery of energy services.	

Operational Priority	ADB Energy Policy	World Bank Energy Policy	United Nations Energy Policy	JBIC Energy Policy
6. Governance	Support will also be extended for improving the governance of public sector organizations. In countries where competition is possible, ADB will support restructuring and the creation of an enabling environment for the transfer of commercial activities to the private sector. ADB will prepare and implement energy projects with due emphasis on accountability, participation, predictability, and transparency, which are identified as basic elements of good governance.	Strategy for a clean energy future includes policies that call for: (i) removal of broad-based subsidies; (ii) establishment of a credible legal and regulatory framework that provides stability on rules and prices that will induce investments into financially viable products; (iii) development of enabling policy environments through regulatory interventions; (iv) creation of market-based approaches such as emission trading, energy service companies, innovative clean energy, and energy efficiency funds, etc.; (v) reduction of transaction cost at the supply and retail level; and (vi) information dissemination regarding energy savings and clean energy options.	Public service providers need incentives to operate efficiently through sound corporate governance and sector regulation. Reforms to energy markets should focus on removing obstacles to efficient functioning of these markets.	
7. Cofinancing	To help meet the large capital requirements in the energy sector of its DMCs, ADB will continue to catalyze additional funds from other sources through official and commercial cofinancing grants, and export credit operations.	Even with an improved regulatory environment and use of policy and political risk mitigation instruments, the challenge of financing incremental costs and reducing technology risks will be significant. These issues could be addressed by means of innovative financial instruments, which could complement existing World Bank Group and International Finance Corporation (IFC) instruments. Among those which hold promise	Public financing from both domestic resources and official development assistance, combined with private entrepreneurship and investment, are needed to develop energy services for the poor.	JBIC provides low interest and long-term loans to assist developing countries in their self-help efforts toward sustainable economic development, by financing the building of their economic and social infrastructure.

Operational Priority	ADB Energy Policy	World Bank Energy Policy	United Nations Energy Policy	JBIC Energy Policy
		are the following: (i) clean energy financing vehicle; (ii) power rehabilitation financing facility; (iii) project development fund; and (iv) venture capital funds for technology adoption.		
8. Capacity Building	Capacity building will be supported in DMCs for activities in line with the energy sector policy.			
9. Private Power Generation	ADB will assist its DMCs in creating an enabling environment for private sector participation, preparing private sector projects that are compatible with the move to competitive electricity markets, and selecting their developers through ICB.	To produce the greatest impact, the World Bank combines financing for energy supply reforms that meet the Bank's four priorities for the energy sector. It deploys financing instruments following a hierarchy that is based on country creditworthiness and starts with loans, equity investments, and guarantees to catalyze private investment in the sector.		
10. Public Power Generation	ADB will continue to assist its DMCs when power generation capacity additions (including hydropower capacity), which are beyond the private sector capability or interest, are needed.	Private investments take priority but, where private investments and guarantees cannot be catalyzed or for investment that the private sector should not undertake, the World Bank provides sovereign-guaranteed loans and credits to state-owned energy suppliers for such investments.		

Operational Priority	ADB Energy Policy	World Bank Energy Policy	United Nations Energy Policy	JBIC Energy Policy
C. Addressing Regional and Global Environmental Impacts	ADB will support measures to address acid rain problems, use of clean energy, and Kyoto Protocol mechanisms for greenhouse gas abatement; and by financing renewable energy projects.		The essential beneficial role of energy as an input to achieving this Millennium Development Goal (MDG) is not reflected in the MDG framework. Energy use and production, however, affect local, regional, and global environments. The poorest countries are generally acknowledged to be among the most vulnerable to the impact of climate change.	JBIC is supporting projects directly aimed at environmental conservation and improvement, while mainstreaming considerations for natural and social environments in its finance operations. Japan Greenhouse Gas Reduction Fund, Asia's first fund to reduce greenhouse gas, and Japan Carbon Finance, Ltd.
1. Environmental Protection	ADB will help its DMCs address regional acid rain problems. ADB will assist interventions in the energy sector that increase the sustainable use of cleaner forms of energy and that support the Kyoto Protocol mechanisms for greenhouse gas abatement within the overall framework of the United Nations Framework Convention on Climate Change (UNFCCC). Assistance will also be provided to DMCs to address environmental issues related to the existing use of fuels, and reduce poverty through environmental protection.	Protect the environment by removing market and regulatory barriers to renewable energy and energy efficiency investments; and reducing gas flaring, reducing or eliminating local pollution, and facilitating carbon trading and joint investments to reduce greenhouse gas emissions.	The environmental sustainability of energy supply and consumption should be enhanced to reduce environmental and health hazards. This requires measures that increase energy efficiency, introduce modern technologies for energy production and use, substitute cleaner fuels for polluting fuels, and introduce renewable energy.	The clean development mechanism (CDM) is becoming increasingly important in preventing global warming, given the need for measures in developing countries where emissions have been increasing.

Operational Priority	ADB Energy Policy	World Bank Energy Policy	United Nations Energy Policy	JBIC Energy Policy
2. Efficiency Improvement	ADB will assist its DMCs in the design and implementation of measures to improve the efficiency of energy supply and use. This includes assistance for reducing technical and non-technical losses.	Many of the technologies needed to achieve clean energy for development are important first steps in paving the way to address the challenge of reducing greenhouse gas emissions. The higher the efficiency of thermal power plants, the greater the uptake of renewable energy technologies and nuclear power, and the greater the efficient use of energy in industry, buildings, and transportation sector, the lower the emission of greenhouse gas.	Improving energy efficiency and increasing reliance on advance energy technologies, including cleaner fossil fuel technologies.	JBIC fund projects that contribute to anti-global warming. It funds thermal power plant projects to reduce environmental stress caused in power generation by switching to natural gas, which releases less carbon dioxide (CO_2) than other energy sources such as coal and oil. It also funds cogeneration projects to economize on fuel and to reduce CO_2 emissions through efficient use of energy by using cogeneration systems.
3. Energy Conservation	ADB will assist its DMCs in the design and implementation of measures for energy conservation and demand-side management.			
4. Acid Rain	ADB, in cooperation with UNEP and the Stockholm Environment Institute, provided technical assistance (TA) that eventually led to the promulgation of the Malé Declaration in 1998 by South Asian countries to combat air pollution. In East and Southeast Asia, ADB is cooperating with the Japanese East Asia Network in monitoring acid rain.			JBIC's financing policy for energy and natural resources adheres to the environmental guidelines of alleviating/minimizing environmental impacts, reducing gas flare, and reducing So_2/NO emissions.

Operational Priority	ADB Energy Policy	World Bank Energy Policy	United Nations Energy Policy	JBIC Energy Policy
5. Greenhouse Gas Abatement	The blending of ADB resources and GEF grants will allow DMCs to shift more rapidly toward renewable energy technologies. Under the Kyoto Protocol of December 1997, 38 industrialized countries and the European Union have committed to reduce their greenhouse gas emissions to a level about 5.2% lower than the 1990 level.	Transformational policies and strategies will be needed to meet national expectations of secure, safe, and clean energy to deal with the implications of climate change. To reduce the threat of human-induced climate change will require a significant reduction in the emissions of greenhouse gas globally. The energy sector accounts for about 80% of greenhouse gas emissions and the agricultural sector for most of the remaining 20%.	Policies and programs are needed to facilitate the widespread development and adoption of environmentally friendly technologies for energy production and use, including low-carbon technologies. UNDP supports the introduction and adaptation of low emission technologies to promote economic growth and social development while mitigating greenhouse gas emissions.	JBIC participated in the Prototype Carbon Fund, which was established by the World Bank in 2000 to support a project reducing greenhouse gas emissions. JBIC committed $10 million for the fund. JBIC is also planning to establish the Japan Carbon Fund in the near future.
6. Renewable Energy	Renewable energy deserves priority for sustainable energy development, as it meets the objectives of environmental improvement, increasing access to energy (in off-grid application), and poverty reduction.	GEF is playing a key role in the design of comprehensive rural electrification programs that involve both traditional grid-extension approaches as well as innovative off-grid approaches (solar, wind, gas, geothermal, etc.). Renewable energy and energy efficiency are integral components of the Bank's energy strategy. In 2004, the Bank committed to achieving 20% average annual growth in renewable energy and energy efficiency investment over the next 6 years.	Develop and disseminate alternative energy technologies with the aim of giving a greater share of the energy mix to renewable energy.	JBIC is also active in funding renewable energy projects such as wind power projects and hydropower projects.

Operational Priority	ADB Energy Policy	World Bank Energy Policy	United Nations Energy Policy	JBIC Energy Policy
D. Promoting Regional Cooperation	ADB will assist its DMCs in identifying and implementing energy projects (including hydropower and gas-based power generation projects, mainly for export) that promote regional trade with economic gains for all participating countries.	Energy integration has recently gathered momentum in several regions, and the World Bank has supported efforts to help participating countries ensure their energy security and reliability of energy supply in the most efficient and cost-effective manner.	Promotion of regional energy production and supply cooperation under market conditions.	
1. Regional Energy Trade	ADB is a key facilitator and honest broker of regional and subregional cooperation in Asia. Toward this end, it provides considerable support through regional TA and complementary project investment in national infrastructure.		Promotion of regional energy cooperation and integration through the establishment of subregional power pools. These power pools help address the challenges of uneven energy resource distribution.	
E. Millennium Development Goals	ADB energy policy works to eradicate extreme poverty, promote gender equality, and ensure environmental stability.		The UN is developing a set of tools to assist countries in integrating energy into national poverty reduction strategies and other development planning activities at the national level. UNDP's efforts in energy are focused on supporting the achievements of the MDGs, especially the target of reducing by half the proportion of people living in poverty by 2015. The program works in the context to eradicate extreme poverty, promote gender equality, and ensure environmental stability.	JBIC loans have been tackling the issue of poverty reduction, keeping in mind the need to contribute to the attainment of the MDG (goals 1–6). Supply of power and electricity is indispensable for the improvement of the quality health care services, education, and economic opportunities.

Sources: Asian Development Bank. 2000 Review, United Nations, Japan Bank for International Cooperation, and World Bank energy policies.

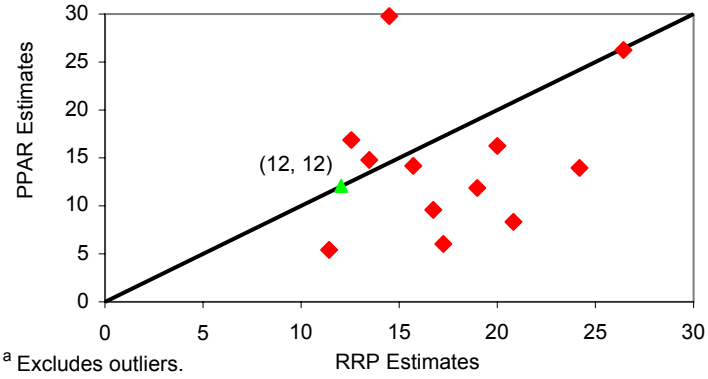
POWER PROJECT EFFICIENCY EVALUATIONS

Ex-Ante and Ex-Post Economic Internal Rates Of Return (EIRRs) For Power Projects

1. The ex-ante and ex-post economic internal rates of return (EIRRs) for power projects are compared (see Figures A10.1 to A10.8). The ex-post EIRRs estimated at the time of evaluation were lower than the estimates at the time of project approval for 61% of thermal energy generation and 52% of transmission and distribution projects. Hydropower projects performed better in terms of this criterion—EIRRs for 50% of hydropower projects reestimated in the project performance audit report (PPAR) exceeded the initial estimates. Reasons for the divergence between ex-ante and ex-post EIRR estimates include (i) less than expected tariff increases, (ii) higher than expected operating costs, (iii) lower than expected demand, and (iv) delays in implementation. Despite being lower than expected, 51 of the 68 evaluated power projects (75%)[1] achieved EIRRs at evaluation that were greater than or equal to the 12% benchmark. Despite the lower ex-post EIRRs, evaluation results indicate that a clear majority of the projects was economically justified and that the benefits generated are likely to be sustained.

2. In the energy sector, financial viability is a fundamental issue. Information is not available to compare the financial internal rates of return (FIRRs) with the average weighted cost of capital for all projects. In 73% of the power projects evaluated, the ex-post FIRRs were lower than the ex-ante estimates. Lower FIRRs occurred in 75% of transmission and distribution projects, 88% of hydropower projects, and 62% of thermal projects. Reasons for this include overoptimistic sales projections, failure to adjust tariffs to the required levels, cost overruns, and implementation delays. For hydropower projects, lower than expected power generation is sometimes due to less than expected water flow.

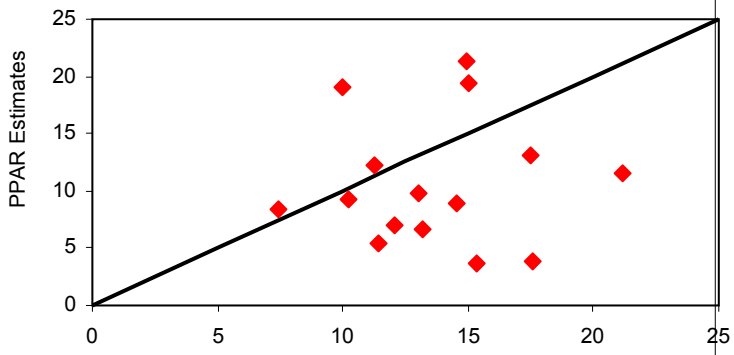
Figure A10.1: EIRRs of Conventional Energy Generation Projects at RRP and PPAR (%)[a]



[a] Excludes outliers.

EIRR = economic internal rate of return, PPAR = project performance audit report, RRP = Report and Recommendation of the President to the Board of Directors.
Source: Asian Development Bank database.

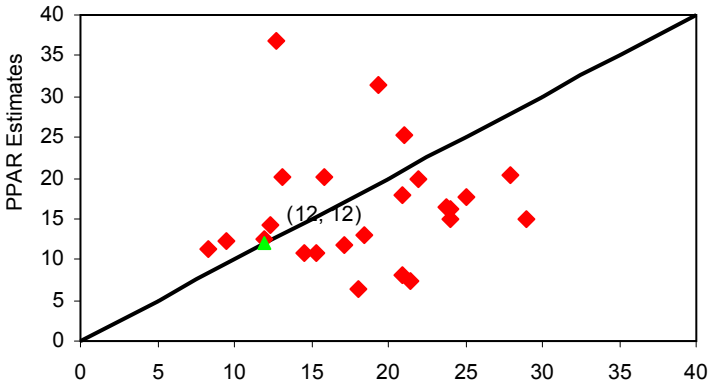
Figure 10.2: FIRRs of Conventional Energy Generation Projects at RRP and PPAR (%)[a]



[a] Excludes outliers.

FIRR = financial internal rate of return, PPAR = project performance audit report, RRP = Report and Recommendation of the President to the Board of Directors.
Source: Asian Development Bank database.

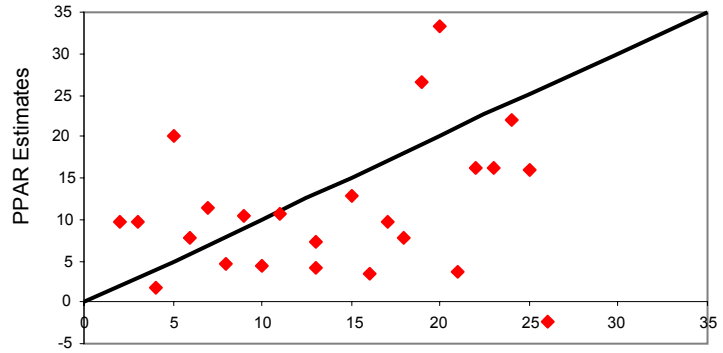
Figure 10.3: EIRRs of Transmission and Distribution Projects at RRP and PPAR (%)[a]



[a] Excludes outliers.

EIRR = economic internal rate of return, PPAR = project performance audit report, RRP = Report and Recommendation of the President to the Board of Directors.
Source: Asian Development Bank database.

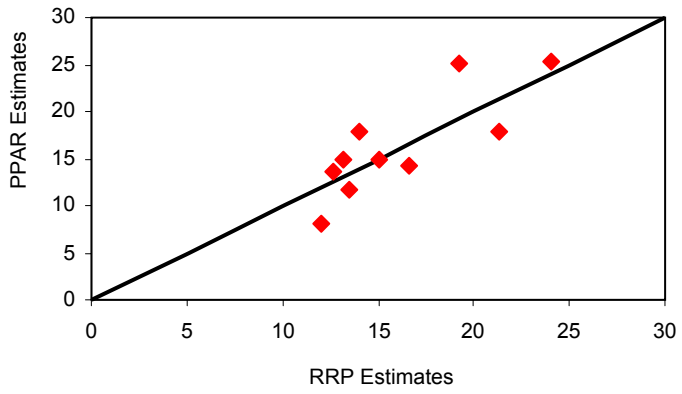
Figure 10.4: FIRRs of Transmission and Distribution Projects at RRP and PAR (%)[a]



[a] Excludes outliers.

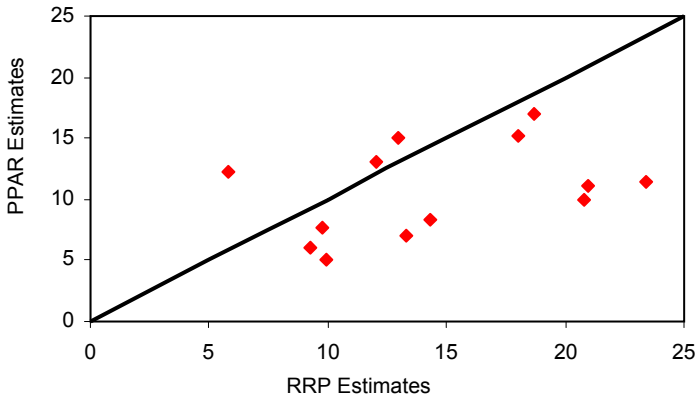
FIRR = financial internal rate of return, PPAR = project performance audit report, RRP = Report and Recommendation of the President to the Board of Directors.
Source: Asian Development Bank database.

Figure 10.5: EIRRs of Hydropower Projects at RRP and PPAR (%)



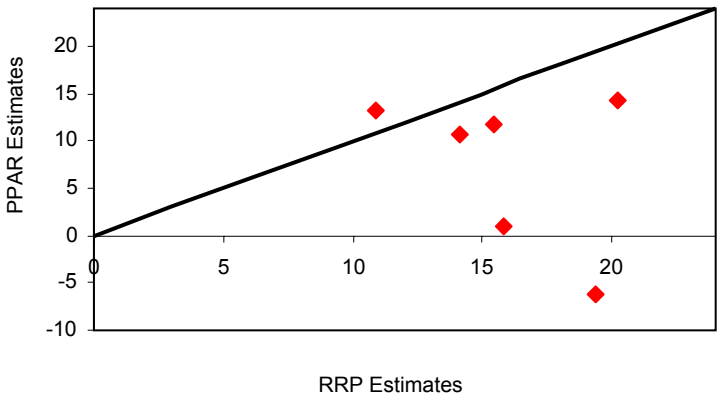
EIRR = economic internal rate of return, PPAR = project performance audit report, RRP = Report and Recommendation of the President to the Board of Directors.
Source: Asian Development Bank database.

Figure 10.6: FIRRs of Hydropower Projects at RRP and PPAR (%)



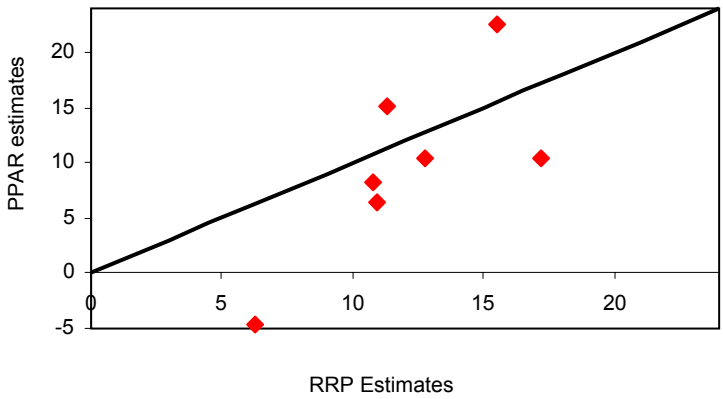
FIRR = financial internal rate of return, PPAR = project performance audit report, RRP = Report and Recommendation of the President to the Board of Directors.
Source: Asian Development Bank database.

Figure10.7: EIRRs of Energy Sector Development Projects at RRP and PPAR (%)



EIRR = economic internal rate of return, PPAR = Project Performance Audit Report, RRP = Report and Recommendation of the President to the Board of Directors.
Source: Asian Development Bank database.

Figure 10.8: FIRRs of Energy Sector Development Projects at RRP and PPAR (%)



FIRR = financial internal rate of return, PPAR = project performance audit report, RRP = Report and Recommendation of the President to the Board of Directors.
Source: Asian Development Bank database.

COMPLIANCE WITH COVENANTS

1. The Asian Development Bank (ADB) has imposed a number of financial covenants on power utilities and governments as part of its lending operations. Utilities are required to submit audited accounts by a deadline and to achieve other financial objectives related to the management of customer receivables and their overall performance. However, there have been many examples of utilities failing to meet these objectives. Overall, 81% of covenants reviewed in Operations Evaluation Department (OED) Project Performance Audit Reports/ Project Performance Evaluation Reports in the period 2000–2006 were fully complied with. However, lack of compliance with financial covenants (18% noncompliant and 14% partially compliant) continues to be a concern.[1] Recently, the power utilities in Assam and Madhya Pradesh both failed to submit audited accounts on time. There is, therefore, a significant problem with compliance with financial covenants.

2. The identification of utilities that produce unreliable accounts is possible from a critical analysis of their accounts and audit reports. The types of problem found in such accounts include the following.

(i) High levels of accounts receivable relative to sales. This indicates that power bills are not being paid but the unpaid amounts are not being written off or provided for.
(ii) Asset and liability account balances that are static for very long periods. This often indicates an old problem that is being ignored, e.g., a failed investment that is not written off. The notes to the accounts will often indicate the nature of the item.
(iii) Suspense account balances showing up on the published balance sheet. Such accounts should be cleared and high and rising balances are often indicators of failures to carry out internal reconciliations properly.
(iv) Inadequate depreciation provisions that write assets off over a longer period than they are likely to be useful for.
(v) High capital work in progress relative to the size of the investment program. This often indicates that costs such as feasibility studies and initial work on projects that have not been undertaken or completed are not written off but left in the balance sheet.
(vi) Very high levels of stocks relative to the use made of those stocks. This may indicate high levels of redundant stock or a failure to write off any discrepancies between physical and financial stock balances.
(vii) Failure to maintain fixed assets records.
(viii) Failure to reconcile accounts with other entities in the power sector.
(ix) Failure to provide for pension liabilities. Accounts often show utilities making pension payments but without provisions for future liabilities.
(x) Qualifications on particular balances in the auditor's reports, especially qualifications that recur from year to year.
(xi) Audit reports which give unqualified opinions on accounts that contain the sort of problems discussed above. This often suggests that the auditor has a relaxed view of what constitutes a fair presentation of the accounts and may suggest that there are likely to be other problems in the accounts which will be exposed by scrutiny of more detailed accounting records.

[1] The 2005 OED review indicated a compliance level of 61%.

3. Companies that produce dubious accounts create serious difficulties in setting financial objectives. The financial indicators which ADB has adopted in the energy sector include the current ratio, debt equity ratio, debt service coverage ratio, return on net fixed assets, return on equity, and self-financing ratio. All of these ratios are seriously distorted by inaccuracies in accounts. The current ratio of a company that fails to provide for bad debts will look more favorable than it should because it exaggerates its current assets. The debt equity ratio will also appear too favorable because the size of the equity is exaggerated. The debt service coverage ratio appears more favorable than it should because revenue is exaggerated and costs are understated. Returns are exaggerated because they are based on exaggerated profits.

4. Poor accounting impedes any setting of financial objectives for utilities, and ADB needs to attach significant priority to improvement of the accounts before applying more sophisticated financial objectives in its covenants. The approach will vary from utility to utility but the following components are likely to be widely applicable:

(i) Initiate dialogue with the utility, its owners, and its auditors; and gain an understanding of the problems in the accounting function and the steps that are likely to be required for improvement. Ensure regular discussions over progress.

(ii) Press for power utilities to be established under companies act legislation rather than as government entities. This has led to improvements in Bangladesh where accounting standards are far higher at Dhaka Electricity Supply Company and Power Grid Company of Bangladesh than at Bangladesh Power Development Board and Dhaka Electricity Supply Authority.

(iii) Consider seeking a change of auditor in cases where the auditor is clearly aware of the problems but unwilling to qualify accounts.

(iv) Continue to require submission of audited accounts against a timetable as a condition of lending but be tolerant of delays where they are the result of efforts to improve the accounts. For example, a lot of work is being undertaken in Assam to improve their accounts which are currently extremely unreliable.

(v) Use technical assistance, which may well need to be long-term, where there is a willingness in the client and its owner to make changes in policies and procedures. This is a major factor in the improvement that is currently being made in Assam.

(vi) Devise thoughtful covenants to tackle the biggest problem areas. Typically, this is often receivables, where utilities may have over 1 year's sales tied up. However, simply requiring the utility to reduce its receivables to the equivalent of 2 months' sales is unlikely to lead to improvement. A more considered approach would require the utility to adopt an accounting policy of perhaps providing for (not writing off) 50% of unpaid bills after 3 months and 100% after 5 months. The utility could also be asked to develop a recovery plan for old debts, including writing off items that are clearly irrecoverable.

(vii) Use restructuring as the opportunity to create "clean" new entities with balance sheets that only contain current, agreed, and properly verified assets and liabilities. Old assets and liabilities can be left in shell companies.

CONGRUENCE OF THE 2000 ENERGY POLICY REVIEW IN THE CONTEXT OF EVOLVING NATIONAL ENERGY POLICY STRATEGY AND PRIORITIES IN DEVELOPING MEMBER COUNTRIES

1. The Asian Development Bank (ADB)'s 1995 Energy Policy[1] emphasized sector reforms to unbundle regulated monopolies and develop independently regulated and privatized energy markets. This was expected to lead to more efficient use of energy, lower costs, and more private investment. Within the framework of the 1995 Energy Policy Review (2000 Review) emphasized four operational priorities: (i) reducing poverty; (ii) promoting private sector involvement; (iii) addressing environmental impacts; and (iv) promoting regional cooperation.

2. The 2000 Review has evolved significantly since 1980. It has been responsive to global pressures (e.g., the oil price shock) and to the changing needs and priorities of its partner developing member countries (DMCs) in the sector. From the 1980s policy, ADB energy policy has shifted focus from supplying generation and infrastructure to more comprehensive and mixed-style strategies attuned to address major energy development constraints and issues. The evolution of the policy has been customer-driven. The 2000 Review, for instance, has become broad in scope but flexible enough to remain relevant in the context of the evolving national energy policies and strategies of DMCs. The development of the 2000 Review can be said to be in gradual transition—moving forward to respond to the changing needs of the sector while taking into account past provisions as building blocks of the current development of the sector. Relevant experiences and lessons from ADB's past power sector assistance are clearly distinguished in the Review. The global trend of harmonizing national priorities and strategy has significantly influenced the existing energy policies of DMCs. The majority of the changes made to national energy policies were made coherent and aligned to the Millennium Development Goal (MDG) objectives.

3. The Operations Evaluation Department (OED) reviewed several national energy policies and strategies made after the release of the 2000 Review. ADB policies, together with other development partners such as the World Bank, United States Agency for International Development (USAID), and Japan Bank for International Cooperation (JBIC) have contributed immensely in the development of the energy sector in the DMCs. ADB and World Bank assistance, through program loans and technical assistance (TA), played a substantial role in shaping the national energy policies and strategies of DMC partners, particularly in areas of sector reform, regulation, and restructuring—the main bulk and most crucial part of the national policy agenda of DMCs for their energy sector.

4. The 2000 Review remains in harmony with the national energy development agenda, priorities, and objectives of ADB's partner DMCs. However, the country strategy and programs (CSPs) have not made any explicit reference to the 2000 Review as the guiding principles of ADB's program assistance in developing countries' energy sectors.

5. The discussion below further illustrates the congruence and relevance of the 2000 Review in the context of the evolving national energy policies and strategies of DMCs.

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[1] ADB. 1995. *The Bank's Policy Initiatives for the Energy Sector*, Manila.

6. **India.** India's 10th Five Year Strategy on energy (2002–2007)[2] focused on (i) energy security; (ii) infrastructure development (refining capacity, regulatory mechanism; (iii) efficiency improvement (benchmarking of the hydrocarbon sector with international standards, oil conservation, demand-side management); (iv) environment and quality improvement; (v) reforms; and (vi) regulatory mechanism. These are all aligned with the 2000 Review priority areas. In recognition of the sector issues and complexities,[3] ADB tried to be selective in its operational strategies. The country strategies and program for India from 2002 to 2005[4] responded to the priorities of the 10th Five-Year Strategy, giving priority to: (i) developing hydrocarbons and power infrastructures; (ii) promotion of private and public sector investments (particularly in developing its national transmission grid); and (iii) power sector reforms and restructuring (including private sector participation and critical investment to support improved efficiency, system reliability, and increased distribution coverage through rural electrification). All these interventions are within the broad scope of the 2000 Review. ADB has taken a phased approach and has prioritized addressing the most crucial bottlenecks of the sector's development—reform and restructuring. However, it has also worked on improving the efficiency of crucial energy investments and resources (e.g., national transmission grid development and hydrocarbons), in consideration of India's environmental and energy security concerns.

7. In 2006, the Government of India released a draft of the 11th Five Year Plan (2008-2012). The plan was geared to evolve policies that can ensure generation capacity created in an efficient, least-cost manner while emphasizing exploitation of India's hydro potential and nuclear capabilities, especially in the field of breeder reactions. The 11th plan has even a broader scope, which covers more elements of the 2000 Review: (i) ensure energy competition in each sub-segment of the energy sector; and remove all entry barriers to rationalize optimal fuel and technology choices for extraction, conversion, transportation, and end use of energy; (ii) ensure energy pricing that leads to efficient choice of fuel, inter-fuel substitution, and technology so that resource allocation takes place based on market forces operating under a credible regulatory regime; (iii) provide incentives for rational use of energy across all sectors including agriculture, industry, commerce, domestic, personal transport, public transport, and haulage; (iv) ensure an institutional framework that provides a level playing field to public sector and private sector players, and provides comparable incentives to producers across all energy sectors; (v) ensure a consistent tax and regulatory structure across all energy subsectors; (vi) meet social objectives as far as possible through direct trade and tradable entitlements offered to those genuinely in need; (vii) treat environmental externalities uniformly under the "polluters pays" principle; (viii) strengthen institutions for promoting energy conservation and energy efficiency; (ix) develop renewable and non-conventional energy; (x) set up Research & Development to develop technology and energy sources that will enhance energy security leading to energy independence. The 2000 Review comprehensively covers, and remains responsive to, the new strategy directions of the 11th plan. The Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) initiative reflects the 2000 Review major thrust on poverty reduction, to provide electricity access to all households, particularly the poor.

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[2] Source: India's National Development Council.
Available: http://planningcommission.nic.in/plans/planrel/fiveyr/10th/volume2/v2_ch7_3.pdf

[3] The country strategy and program for India (2003–2005) has indicated that reforms have been less successful. After unbundling power generation, transmission, and distribution, respond of private investments remained weak. The country strategy and program (2003–2005) indicated that huge losses of state electricity boards (SEBs) remain a pertinent issue in the sector.

[4] OED reviewed country strategy and programs starting 2002–2005.

8. **People's Republic of China** (PRC). The PRC's energy strategy is directed toward addressing long-term concerns on energy supply, security, and sustainability issues.[5] In 2000, its 10th Five Year Plan (2002-2007) raised major concern on reverting environmental degradation, which have been the result of the PRC's intensive energy production and heavy reliance on coal during the past regime. These similar sectoral issues have been recognized by the 2000 Review, thus defining one of its major operational strategies to address concern for environmental protection.[6] The 2000 Review policy context support the PRC's evolving thrusts and focus in energy development: (i) environmental protection and improvement, (ii) development of cleaner/renewable energy, and (iii) energy efficiency. In 2004, the Development Research Center of the PRC's State Council completed its National Energy Strategy and Policy Report,[7] which recommended policy thrusts that are in harmony with the 2000 Review.

9. The 11th Five Year energy strategy of the PRC further declared its stance on: (i) enhancing energy efficiency; (ii) improving energy structure through comprehensive development of coal, electricity, oil and gas, and new energy resources; (iii) developing energy that considers regional balance; demands of urban and rural development; and an appropriate mix/match of energy production, transportation, and consumption; (iv) improved participation in terms of international energy resource development, and good use of both domestic and international energy; (v) enhancing research and techniques in energy production and conservation, (vi) strengthening environmental protection by reducing impacts of energy production and consumption; (vii) emphasizing energy safety, establishing an early warning system and strategic oil reserve, and preparing measures that ensure energy production; and (viii) enlarging the roles of the market. All these remain congruent to the thrust of the 2000 Review. In addition, the PRC's Medium and Long Term Energy Conservation Plan[8] and the Renewable Energy Law[9] are relevant to the 2000 Review. It is difficult to attribute the level of the 2000 Review's influence on PRC's evolving energy policy. Generally, ADB and PRC policy partnership has been operated through activities financed under ADB's TA program for the energy sector: (i) energy efficiency and conservation, (ii) clean energy promotion, (iii) power sector and market restructuring, (iv) tariff reform, and (v) private sector participation.

10. **Sri Lanka**. The persistence of political unrest in the country hampered the large potential of the sector. The ADB's country strategy and program has included energy among the five core sectors for ADB's intervention. In 2003, ADB provided TA to develop the country's energy

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[5] These issues include high energy intensity, heavy reliance on coal, reform of energy tariffs, and establishment of competitive power markets.

[6] The United Nations Framework Convention on Climate Change (UNFCCC) of March 1994 had been ratified by 181 countries as of December 1999. The UNFCCC aims to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The UNFCCC recognizes explicitly that energy consumption in developing countries needs to grow to support economic development and reduce poverty, and requires industrial countries to aim for greenhouse gas emission stabilization. The Global Environment Facility (GEF), the financial instrument of the UNFCCC, provides grants to assist developing countries in (i) removing barriers to energy efficiency and conservation, (ii) promoting the adoption of renewable energy by removing barriers to and reducing the implementation costs of commercial or near-commercial technologies, and (iii) reducing the long-term costs of low greenhouse gas-emitting energy technologies. The GEF has recently adopted a policy to expand opportunities for regional development banks to access its resources.

[7] This report builds on the recommendations of the National Energy Strategy and Policy Report by outlining additional issues in design and implementation of a comprehensive energy strategy.

[8] National Development and Reform Commission. 2005. *China Medium and Long Term Energy Conservation Plan*. The People's Republic of China.

[9] 2006. *The Renewable Energy Law.* The People's Republic of China.

master plan[10] to identify the long-term directions of the sector. However, the master plan has yet to be implemented because of a change of government. A draft national energy policy and strategies for Sri Lanka proposed many strategies for the energy sector, including provisions to: (i) provide the basic energy needs of the population; (ii) ensure energy security through a diversified and rational energy mix; (iii) promote energy efficiency and conservation through efficient management and operation, and efficient utilization and conservation of energy; (iv) promote and develop indigenous resources to minimize the vulnerability of energy supplies to external factors by supporting oil and gas exploration programs; (v) adopt an appropriate pricing policy to reflect real energy cost, need for targeted subsidies, and competitiveness of locally produced goods and services in the regional and international markets; (vi) enhance energy sector management capacity to improve technological developments and good governance; (vii) promote consumer protection and ensure a level playing field for all stakeholders in the sector; (viii) enhance the quality of energy services by imposing appropriate quality standards and regulatory interventions; and (ix) provide protection from adverse environmental impacts. Many of these suggestions were made in the Regional Energy Security study carried out with the assistance of the USAID-funded South Asia Regional Initiative on Energy (SARI/Energy). The proposed strategies are all relevant to the 2000 Review and fall within the scope of the policy's context.

11. **The Philippines**. In 2005, OED conducted an evaluation of the Philippine energy sector.[11] Findings indicated that ADB operational strategies in energy and energy policies have tried to meet the country's changing development needs in the sector. However, such needs have been difficult to quantify in practice, and the formulation of some operational strategies may have been based on overestimated demands for power capacities. The ADB assistance program has been broadly relevant in addressing the needs of the sector and in complying with ADB's sector strategies and policies. The focus of assistance shifted from adding generation capacity to improving power infrastructure (transmission and distribution), and recently shifted to creating an enabling environment to attract private investment (in terms of physical infrastructure, institutional conditions, and policy). Although it was not explicitly stated in the strategy and program papers, ADB's sector strategies for the Philippine sector have covered: (i) development of indigenous energy and energy infrastructure to reduce heavy reliance on imported fuel, (ii) provision of reliable and affordable electricity, and (iii) establishment of a financially viable power sector. All remain relevant thrusts of the 2000 Review.

12. The institutional structure of the Philippine power sector has changed substantially over the past decades. The Electric Power Industry Reform Act (2001), for instance, is ushering in a new unbundled structure of the power sector. Structural changes promoted by this Act has been supported by local energy priorities and the evolving policy recommendation of development partners (through policy dialogues and TA), including ADB. However, ADB's role in power sector restructuring in the Philippines has been criticized by different civilian groups and nongovernmental organizations. Critical views pointed out that the external borrowing, including that from ADB, have (i) added a burden to the country's increasing debt; and (ii) resulted in some cases of fuel corruption and mismanagement within the sector, which have caused high

[10] ADB. 2003. *Technical Assistance to Sri Lanka for Energy Sector Master Plan*. Manila (TA No. 4113). The TA was rated "generally successful".

[11] ADB. 2005. *Sector Assistance Evaluation of the Philippine Power Sector.* Manila. This view was based on Malalua, N. and J.J. Chavez. 2005. Private Power Failure, ADB and Policy (Mis)governance in Asia. *Focus on the South*. May (pp. 13–19).

electricity prices and burdened the poor most.[12] OED assessed ADB's operational programs in this sector "partly successful". The assessment recognized that ADB-supported projects have mostly achieved their expected outputs satisfactorily, with a good level of quality. However, there were often delays, scope reduction, or in some cases cost overrun. Despite efforts, ADB policy dialogue has not always achieved its objectives. The program as a whole has not achieved some of its key sector objectives. ADB has played a major role in promoting power sector restructuring.

13. The 2000 Review's generic provisions have not considered precautionary safeguards that may be relevant to address such issues. Overall, the Review has been relevant and responsive to the developing needs of the Philippine power sector, but the overwhelming presence of governance issues in the sector delays the effectiveness of the policy and sector operations in the country.

14. The following table summarizes the relevance of the 2000 Review on energy strategy direction of DMCs.

[12] ADB. 2005. *Sector Assistance Evaluation of the Philippine Power Sector.* Manila. This view was based on Malalua, N. and J.J. Chavez. 2005. Private Power Failure, ADB and Policy (Mis)governance in Asia. *Focus on the South*. May (pp. 13–19).

Table A12: Relevance of the 2000 Review on Energy Strategy Directions of DMCs

Country	Relevant Sectoral Issues	Country/National Energy Strategy	Relevant Elements of the 2000 Energy Policy Review	ADB Energy Strategy Addressed in the CSP/CAP	ADB Projects Since the Release of the 2000 Review
India	**11th Five Year Plan** Electricity ▪ Rapid growth will place heavy demand on electric power Coal ▪ Coal production is nationalized at present and limited private investment is allowed ▪ Environmental pollution Oil and Gas ▪ High dependence on crude oil imports ▪ High subsidy ▪ Pricing of domestically produced natural gas and its allocation to power and fertilizer industry ▪ Strengthening upstream regulation ▪ Ensuring competition and open access **CSP (2003–2006)** ▪ Reforms have been less successful. After unbundling generation, transmission, and distribution, private investments were allowed but the response was weak Huge losses of SEBs	**11th Five Year Plan** ▪ Ensure energy competition in each subsegment of the energy sector and remove all entry barriers to rationalize optimal fuel and technology choices for extraction, conversion, transportation, and end use of energy ▪ Ensure energy pricing that leads to efficient choice of fuel, inter-fuel substitution, and technology so that resource allocation takes place based on market forces operating under credible regulatory regime ▪ Incentivize rational use of energy across all sectors including agriculture, industry, commerce, domestic, personal transport, public transport, and haulage ▪ Ensure an institutional framework that provides a level playing field to public sector and private sector players, and provides comparable incentives to producers across all energy sectors ▪ Ensure a consistent tax and regulatory structure across all energy subsectors ▪ Meet social objectives as far as possible through direct trade and tradable entitlements offered to those genuinely in need ▪ Treat environmental externalities uniformly under the "polluters pays" principle ▪ Strengthen institutions for promoting energy conservation and energy efficiency ▪ Develop renewable and nonconventional energy ▪ Set up Research & Development to develop technology and energy sources that will enhance energy security, leading to energy independence	▪ Private sector participation ▪ Sector restructuring ▪ Efficiency improvement ▪ Subsidies/efficiency improvement ▪ Sectoral reform and restructuring ▪ Tariff reform ▪ Poverty reduction/rural electrification ▪ Environmental protection ▪ Energy efficiency ▪ Renewable energy development ▪ CDM ▪ Capacity building and information systems	**CSP (2003–2006)** ADB promoted South Asia Subregional Economic Cooperation. Action programs were developed for subregional projects in energy, environment, transport, and private sector cooperation. Emphasis on hydrocarbons and power development. Investments were directed to removing key bottlenecks where private investment is not forthcoming. **CSP Update (2005–2007)** Continued association with private and public sectors, especially in developing the national gas transmission grid in the country; focus on sector restructuring, including private sector participation and critical investments to support improvement of efficiency, system reliability, and increase distribution coverage (including rural electrification) **CSP Update (2006–2008)** Continued focus on important areas such as strengthening the national transmission grid and other critical investment needs Continued focus on state power sector loans for upgrading transmission, distribution, rural electrification, and capacity	**No loans approved since 2000** **Technical Assistance:** **2000** ▪ TA 3573-IND: Reorganization Plan for Gujarat Electricity Board ▪ TA 3574-IND: Consumer Awareness and Participation in Power Sector Reforms ▪ TA 3575-IND: Support to Gujarat Electricity Regulatory Commission **2001** ▪ TA 3734-IND: Kerala Power Sector Development Program **2002** ▪ TA 3882-IND: Development of a Transfer Scheme for Madhya Pradesh Power Sector Reform ▪ TA 3883-IND: Legal Support for Madhya Pradesh Power Sector Reform ▪ TA 3885-IND: Energy Efficiency Enhancement Project ▪ TA 3953-IND: Assam Power Sector Development Program ▪ TA 3972-IND: Strengthening Consumer and Stakeholder Communication for

Country	Relevant Sectoral Issues	Country/National Energy Strategy	Relevant Elements of the 2000 Energy Policy Review	ADB Energy Strategy Addressed in the CSP/CAP	ADB Projects Since the Release of the 2000 Review
				building of power sector institutions aimed to improve metering, collection of bills, and reducing system losses	Madhya Pradesh Power Sector Reform **2003** ▪ TA 4083-IND: Building the Capacity of Assam Electricity Regulatory Commission ▪ TA 4182-IND: Urban Clean Fuel ▪ TA 4241-IND: Reorganization of Assam State Electricity Board ▪ TA 4242-IND: Institutional Development for Rural Electrification ▪ TA 4243-IND: Policy and Legal Support for Power Sector Reforms **2004** ▪ TA 4380-IND: Uttaranchal Power Sector Development ▪ TA 4496-IND: Capacity Building for Clean Development Mechanism ▪ TA 4498-IND: North East Power Development ▪ TA 4336-IND: Hydropower Development **2005** ▪ TA 4630-IND: Uttaranchal Power Sector Capacity Building

Country	Relevant Sectoral Issues	Country/National Energy Strategy	Relevant Elements of the 2000 Energy Policy Review	ADB Energy Strategy Addressed in the CSP/CAP	ADB Projects Since the Release of the 2000 Review
China, People's Republic of	**Major problems in energy conservation work** ▪ Insufficient knowledge and guideline policy on energy conservation ▪ Energy conservation laws and regulations are incomplete. PRC Energy Conservation Law, effected in 1998 ▪ No effective energy conservation incentive policy ▪ Energy conservation mechanism adaptive to market-driven economy system has not yet been established ▪ Development and dissemination of energy conservation technology is inadequate ▪ Capacity building in energy conservation regulatory and service institution lags behind	**China Medium and Long Term Energy Conservation Plan (2005)** Principles to be followed for energy conservation 1. Adhere to taking energy conservation as an important component of changing economic growth pattern 2. Adhere to the integration of energy conservation with structural adjustment, technology progress, and management enhancement 3. Adhere to the integration of the function of market mechanism with government macro-regulation 4. Adhere to the integration of lawful management and policy incentives 5. Adhere to giving prominence to emphases, providing guidance by categories, and promoting comprehensively 6. Adhere to public participation by the whole society Implementing measures ▪ Adhere to and implement the guideline of giving priority to energy conservation ▪ Formulate and implement unified and harmonized energy and environment policies to promote energy conservation ▪ Formulate and implement industrial policies to facilitate structure adjustment ▪ Formulate and implement incentive policies to intensify energy conservation ▪ Strengthen energy conservation management according to laws ▪ Accelerate development, demonstration, and promotion of energy conservation technology ▪ Promote new market-based energy conservation mechanism ▪ Reinforce energy conservation	▪ Environmental improvement ▪ Energy efficiency/ improvement/ regarding structural reform ▪ Sector reform	**CAP (2001–2003)** ADB will encourage private sector participation (LIQUIFIED NATURAL GAS terminals and gas pipeline); technology transfer to address the Government's concerns over pollution standards and production efficiency; development of merchant power plants; privatization of state-owned power plants; creation of competitive markets for electricity; power restructuring to introduce competitive power markets; priority given to projects involving strengthening and modernization of the rural and urban distribution systems. ADB will focus on small to medium hydropower projects in the western region. ADB will identify more renewable energy projects (e.g., wind power, solar power, and use of biogas). **CSPU (2003–2005)** Proposed program will improve system-wide power transmission and rural electrification systems; and develop small-scale hydropower projects in the west, and coal bed methane demonstration projects in Shanxi and Liaoning. Ongoing and proposed TA programs will support power sector reforms to develop competitive markets and the necessary regulatory capability, and develop pro-	**Loans approved since 2000** **2000** ▪ L 1818-PRC: Wind Power Development **2001** ▪ L 1901-PRC: Shen-Da Power Transmission and Grid Rehabilitation **2002** ▪ L 1922-PRC: Hebei Zhanghewan Pumped Storage **2003** ▪ L 2032-PRC: Gansu Clean Energy Development **2004** ▪ L 2146-PRC: Coal Mine Methane Development ▪ L 2112-PRC: Liaoning Environmental Improvement **2006** ▪ L 2260-PRC: Inner Mongolia Autonomous Region Environment Improvement **Technical Assistance** **2000** ▪ TA 3547-PRC: Interregional Power Transmission Network Development Strategy **2001** ▪ TA 2477-PRC: Hebei-Zhanghewan Pumped Storage (Supplementary) ▪ TA 3673-PRC: Pro-Poor Urban Heating

Country	Relevant Sectoral Issues	Country/National Energy Strategy	Relevant Elements of the 2000 Energy Policy Review	ADB Energy Strategy Addressed in the CSP/CAP	ADB Projects Since the Release of the 2000 Review
		regulation on key ▪ Intensify promotion, education, and training of energy conservation ▪ Enhance organization and leadership, and promote program implementation		poor tariff structures for rural consumers and urban district heating. ADB assistance in 2003–2005 will help develop cleaner forms of energy (e.g., small-scale hydropower, coal bed methane). **CSPU (2006–2008)** The 2006–2008 program will cover clean energy and energy conservation development (e.g., developing cleaner forms of energy, promoting efficient energy use and renewable energy, and reducing emissions that contribute to global warming). ADB supports CDM-related projects, sponsored mainly by private sector developers, under the Kyoto Protocol as well as existing carbon credit markets.	Tariff Reforms ▪ TA 3730-PRC: Gansu Hydropower **2002** ▪ TA 3840-PRC: Opportunities for the Clean Development Mechanism in the Energy Sector ▪ TA 3931-PRC: Establishing the National Electricity Regulatory Commission **2003** ▪ TA 4117-PRC: Power Pricing Strategy: Tariff Setting and Regulation ▪ TA 4195-PRC: Jiangsu Urban Environment Improvement ▪ TA 4309-PRC : Renewable Energy for Poverty Reduction **2004** ▪ TA 4389-PRC: Waste Coal Utilization Study ▪ TA 4402-PRC: Heating Supply for Urban Poor in Liaoning Province ▪ TA 4416-PRC: Capacity Strengthening of Power Planning Process ▪ ▪ TA 4511-PRC: Energy Development Strategy for the Inner Mongolia Autonomous Region

Country	Relevant Sectoral Issues	Country/National Energy Strategy	Relevant Elements of the 2000 Energy Policy Review	ADB Energy Strategy Addressed in the CSP/CAP	ADB Projects Since the Release of the 2000 Review
	▪ Intensive energy requirement ▪ Existing laws, policies, and regulations on energy needs to be realigned along strategic goal. ▪ Heavy dependence on coal needs urgent solutions to address environmental concern and safety ▪ Promotion of clean and renewable energies remain a challenge ▪ Market mechanisms need to be introduced in setting energy tariffs and establishing full competitive power markets ▪ Need to have transparent, market-oriented tariff setting to reflect the increasing cost for energy production, promote energy efficiency, attract private sector participation, and access to energy for poor.	**11th Five-Year Plan** ▪ Enhance energy efficiency by abiding to energy conservation regulations and measures; ▪ Improve energy structure through comprehensive development of coal, electricity, oil and gas, and new energy resources; ▪ Develop energy while taking into consideration regional balance, demands of urban and rural development, and matching of energy production, transportation and consumption; ▪ Participate in international energy resource development, and make good use of both domestic and international energy; ▪ Enhance research and techniques in energy production and conservation ▪ Strengthen environmental protection by reducing impacts of energy production and consumption ▪ Emphasize energy safety, and establish an early warning system and strategic oil reserve ▪ Prepare measures to ensure energy production, and enlarge the roles of market	▪ Environmental improvement ▪ Energy efficiency/ ▪ improvement ▪ Regional cooperation ▪ Environmental improvement ▪ Renewable/clean energy development ▪ Private sector development ▪ Energy security ▪ Energy structural reform ▪ Poverty reduction		**2005** ▪ TA 4566-PRC: Poverty Reduction in Coal Mine Areas in Shanxi Province ▪ TA 4584-PRC: Inner Mongolia Autonomous Region Environmental Improvement ▪ TA 4706-PRC : Energy Conservation and Resource Management ▪ TA 4649-PRC : Alternative Energy Supply for Rural Poor in Remote Areas **2006** ▪ TA 4812-PRC: Establishment of the Clean Development Mechanism Fund ▪ TA 4819-PRC: Energy Conservation and Resource Management ▪ TA 4783-PRC: Gansu Heihe Hydropower Development

Country	Relevant Sectoral Issues	Country/National Energy Strategy	Relevant Elements of the 2000 Energy Policy Review	ADB Energy Strategy Addressed in the CSP/CAP	ADB Projects Since the Release of the 2000 Review
Sri Lanka	▪ Energy Security ▪ Over reliance on hydro and oil-fired plant ▪ Lack of commercially driven policies ▪ Large losses due to under recovery of costs ▪ Political resistance is impeding reform progress	**National Energy Policy and Strategies** ▪ Provide basic energy needs of the population ▪ Ensure energy security through diversified and rational energy mix ▪ Promote energy efficiency and conservation through efficient management and operation, and efficient utilization and conservation of energy ▪ Promote and develop indigenous resources to minimize vulnerability of energy supplies to external factors; support oil and gas exploration programs ▪ Adopt appropriate pricing policy to reflect real energy cost, need for targeted subsidies, and competitiveness of locally produced goods and services in the regional and international markets ▪ Enhance energy sector management capacity to improve technological developments and good governance ▪ Promote consumer protection and ensure a level playing field for all stakeholders in the sector ▪ Enhance quality of energy services by imposing appropriate quality standard and regulatory interventions ▪ Protection from adverse environmental impacts	▪ Poverty reduction/ rural electrification ▪ Energy security/ diversity ▪ Structural reform ▪ Environmental protection ▪ Renewable energy development ▪ Tariff/energy price restructuring ▪ Sector reform/good governance ▪ Demand-/supply-side efficiency ▪ Environmental protection/ improvement	**CSP (2003– 2005)** In the energy sector, the reform efforts included a transparent automatic price adjustment formula for petroleum products and an average 35% increase in power tariffs. The Government is fully committed to rationalizing and simplifying the tax system. **CSP (2004–2008)** Energy is included among the five core sectors for ADB's intervention. **CSP (2002–2004)** ADB supported formulation of an integrated energy sector master plan to guide future ADB assistance in regional development, agriculture and rural development, and energy sectors.	**Loans approved since 2000** **2000** ▪ L 1929-SRI: Power Sector Development Program (Program) ▪ L 1930-SRI: Power Sector Development Program (Project loan) **Technical Assistance since 2000** **2000** ▪ TA 3450-SRI: Promotion of Private Sector Involvement in Oil and Gas Exploration **2002** ▪ TA 3857-SRI: Restructuring of the Power Sector - Phase II **2003** ▪ TA 4113-SRI: Energy Sector Master Plan ▪ TA 4262-SRI: Rural Electrification and Network Expansion

ADB = Asian Development Bank, CAP = country assistance plan, CDM = clean development mechanisms, CSP = country strategy program, LNG = liquefied natural gas, PRC = People's Republic of China, TA = Technical Assistance.
Sources: ADB country strategies and programs.

ADB ENERGY SPECIALISTS' COMPETENCIES SURVEY

Competency Area	Competence Level			Competency As Percentage of Total Respondents		
	High	Med	Low/None	High	Med	Low/None
Thermal, District Heat, Clean Coal, Coal Bed Methane	7	9	9	28	36	36
Hydropower	8	8	9	32	32	36
Other Renewables	5	8	12	20	32	48
Power Transmission	6	11	8	24	44	32
Oil and Gas Pipeline	0	6	19	0	24	76
Gas Distribution	1	0	24	4	0	96
Power Distribution and DSM	7	4	14	28	16	56
Industrial Efficiency Improvement	2	7	16	8	28	64
Energy Economics, Forecasting	7	6	12	28	24	48
Project Economic Analysis	4	12	9	16	48	36
Tariffs	8	6	11	32	24	44
Corporate Governance	3	4	18	12	16	72
Regulation	3	10	12	12	40	48
Competitive Electricity Market	5	6	14	20	24	56
Unbundling and Restructuring	8	6	11	32	24	44
Financial Management	3	6	16	12	24	64
Project Financial Analysis	7	6	12	28	24	48
Business Model and Financial Projections	7	2	16	28	8	64
Privatization	6	2	17	24	8	68
Public-Private Partnership	3	6	16	12	24	64

DSM = demand-side management.
Source: ADB. 2006: Regional and Sustainable Development Department staff survey.

FUTURE STRATEGIC PRIORITIES

1. The Asian Development Bank (ADB)'s Energy Policy needs to be updated to reflect the changing external environment and the needs of the DMCs. The evaluation findings indicate that, while the principles and objectives of the 2000 Review remain valid and relevant, there is a need to update the policy to better reflect current needs and resources within DMCs and ADB. This includes a consolidation of the new initiatives and strategies, including the Energy Efficiency Initiative (EEI) and the Carbon Fund. The four pillars of ADB's 2000 Review emphasize different aspects of setting investment priorities. However, linkages between the four pillars are not clearly set out. Few if any projects will contribute to all four of these pillars. There were no clear criteria which can be used to set priorities between the four objectives.

2. The evaluation suggests that ADB's support for the energy sector should be driven by two key policy considerations: energy efficiency and good governance. Efficiency can be achieved by: (i) the use of demand side technologies, regulation and time of use tariffs to promote energy efficiency; and (ii) the use of the most energy efficient supply technology in distribution transmission and generation to supply residual load, time of use wholesale pricing and sharing regional energy surpluses.

A. Identifying and Supporting Energy Efficiency

3. Before increasing the supply of energy into a system, all feasible efforts should be made to decrease the demand for energy use through energy efficiency initiatives and increased system efficiencies. Commonly termed "negawatts"[1], estimations indicate energy efficiency efforts to reduce demand cost less than half the cost of adding additional capacity. Energy efficiency initiatives should precede funding for new capacity, however not at the expense of "turning off the lights". Energy use, which is expected to continue to increase with the expanded economies, is likely to remain high in the medium term particularly for Asia. There will be a time lag for energy efficiency initiatives to take effect hence investment in new generation and transmission capacity will be needed to meet the increased demand associated with economic growth.

1. Demand Side Energy Efficiency

4. The economic basis for energy efficiency projects are the relatively large avoided costs of new generation and generally fast returns in the investments.[2] The updated Energy strategy should make it clear that initiatives that promote energy efficiency should be the single largest priority in ADB operations in the energy sector as it will contribute most to reducing the cost of supply. This would be a pro-poor initiative and would avoid the adverse environmental and social impacts that are sometimes associated with new capacity.

5. Energy efficiency projects need to be tailored to sub-national rather than national needs as each region will have different opportunities at the demand and supply side of the energy cycle. Broad based policy frameworks need to be developed at the national level, completed by more specific policies at the regional or provincial levels in large DMCs. These policies should be supported by an appropriate regulatory and/or legal framework to monitor and enforce policy.

[1] As opposed to adding watts, negawatts implies reducing watts.
[2] Usually 24-36 months.

6. Knowledge must be transferred to financing institutions which are likely to fund energy efficiency or to electricity supply companies (ESCOs). However, this process is not likely to succeed if it is based only on the three features which are generally discussed in the Energy Efficiency Initiative (EEI): technology, economics and finance. There are three other requirements which broadly can be classified as implementation issues:

(i) legal and policy support need to be incorporated into energy efficiency designs so that a system of incentives and penalties encourage investment in energy efficiency;
(ii) each specific regional energy efficiency needs to have a measurable base data and outcomes which are incorporated into designs; and
(iii) each specific regional EEI needs to be marketed to the specific energy efficiency targets.

2. Supply Side Energy Efficiency

7. Efforts to increase supply side efficiencies would have both positive economic and environmental benefits. The technical choices should consider minimizing both the total life time costs and include the externalities associated with environmental effects. ADB should actively explore opportunities to fund new high efficiency supply technologies, where these are economically and commercially viable. Many emergent generation technologies [3] have significant promise from an environmental perspective, however there are risks associated with new technologies which have not been proven to be commercially and operationally viable and are not attractive to commercial lenders.

3. Time of Use (TOU) Tariffs

8. ADB should encourage the use of tariff designs and other price signals to encourage measures to promote energy efficiency. The finding of the evaluation confirms that TOU tariffs can exert powerful influence that improves efficiency and reduces the need for additional generation capacity. ADB should more aggressively promote the use of well structured TOU tariffs.

a. Promoting the Use of Cost Effective Renewable Energy

9. Using sustainable renewable energy efficiently increases fuel security and reduces greenhouse gases. Renewable energy projects funded by ADB include hydropower (run of river, large storage, and pumped storage facilities), geothermal wind, solar, biomass and waste generation. The energy strategy update should reflect the environmental and social benefits and mainstream renewable energy. However, there is limited commercial scope for technologies such as wind and hydro, as their energy supplies, wind and water are irregular, and redundancy costs may be too high. The objective should be to create a framework that makes investing in renewable energy a commercially viable proposition.

10. Hydropower technology is advanced and efficient and, and for some projects, provides one of the lowest long run costs of supplying energy and technical systems support[4]. Options include large and medium storage dams, reservoirs with multipurpose facilities, pumped

[3] Newer generation technology such as Integrated Gasified Combined Cycle (IGCC).
[4] Hydropower, as an energy supply source, provides a technical benefit to the power system, i.e., power is readily available to meet peak loads, maintain adequate voltage and frequency levels and supply systems stability.

storage, run-of-river, and small hydro. An increasing number of hydropower plants are under construction or being planned in the Asian and Pacific region. Many of these plants are run-of-river but a few are designed as storage type. Run-of-river type projects generally have small reservoir facilities and are considered less environmentally disruptive than dams with large head ponds, however there is no clear evidence to indicate that the total effects per installed kW is less for run of river dams. This warrants a cautious evaluation of cascading projects.

11. Rural electrification can, in many instances, be most cost efficiently supplied through renewable energy. Much of this could be addressed through low cost/cost effective renewable sources, many of which are suitable for off-grid users. Operational costs are lower due to not being subject to fluctuating prices, like fossil fuels. Furthermore, grid extensions are not required, thus saving on transmission costs.

12. The cost of renewable energy technology fallen in the past five years as a result of economies of scale and the benefits now being better understood by the power industry and the financial institutions which fund them. Wind power has been demonstrated to be commercially viable in India and the PRC. Geothermal energy is widely used in the Philippines and Indonesia. However, many other renewable energy technologies are not yet commercially proven. ADB should support the development of renewable energy initiatives and finance pilot projects where these can be replicated and are capable of providing long term sustainable and competitive energy sources.

13. ADB should place a high priority in providing assistance to develop an appropriate legal, policy and regulatory framework for renewable energy. Supply options include taxes and demand side options include legal obligations such as compulsory levels of supply and voluntary measures such as “green energy” schemes.

4. Reflecting Environmental Costs in Economic Analysis

14. As reflected above, in supply-side energy efficiency and renewable energy initiatives the study recommends the inclusion of externalities into cost benefit analysis. ADB does not, as a matter of routine, reflect environmental costs in the economic analysis undertaken for energy projects. While there have been some attempts, these have generally been for projects that have environmental benefits. Consistently reflecting the environmental benefits and costs in the economic analysis would help ADB to make better decisions in determining which projects to support and identifying the costs and benefits of mitigating environmental costs associated with alternative energy projects. For example, the environmental costs associated with coal generation are typically born by society at large through air pollution and acid rain rather than directly by the project. Because these costs are externalized, thermal power sometimes appears to be a better economic investment than energy conservation, clean energy and renewable energy projects. If environmental externalities were included in the analysis, ADB would be better able to choose which projects to support.[5]

5. Use of Strategic Environmental Assessment

15. Much of ADB’s attention on environmental issues in the energy sector is focused at the project level. This generally focuses on traditional ‘within-the-fence’ efforts to ensure that projects meet the objectives of ADB’s environmental safeguard policies. While attention to

[5] Evaluation Cooperation Group. 2007. The Nexus between Infrastructure and Environment, a joint paper by Evaluation Cooperation Group and the International Financial Institutions including Asian Development Bank.

environmental issues are the project level is important, ADB's approach of primarily focusing on project level safeguards is too narrow. Project-level environmental assessments, however well done, do not adequately handle strategic issues. The project level approach must be complemented by a broader, sectoral level approach to effectively address the strategic elements of the energy environment nexus. Broader questions include things like: (i) Are the right kinds of projects being selected for ADB support? (ii) Are policy reforms preferable to investments in more energy infrastructure? (iii) Could energy efficiency initiatives reduce or eliminate the need for further investment in generation capacity? (iv) What needs to be done to promote renewable energy? (iv) Would regional cooperation in the energy sector be a way to reduce environmental costs? Strategic environmental assessment is a term broadly applied to the scaling-up of environmental assessments beyond the project level to the sectoral or national level. Such assessments, if properly done, would be an appropriate vehicle to help ADB and DMCs to develop more effective strategies to address issues related to the energy/environment nexus. At the national or sectoral level, there are many options for addressing the energy/environment nexus. However, these options may not be apparent if environmental assessments focus on the project level. To achieve this vision requires moving beyond the conventional project level "Do No Harm" approach to a more pro-active "Do Good" approach at the sectoral level.

B. Good Governance

16. Good governance in the energy sector enhances its performance. ADB can help to achieve high governance standards by supporting measures such as:

(i) ensuring that the sector makes effective use of the private sector as an investor and manager;
(ii) applying commercially and sustainable management principles to publicly owned utilities; and
(iii) supporting effective and independent regulation.

1. Making Effective Use of the Private Sector

17. The complete privatization of the power sector will be difficult in most countries in Asia. Many countries do not regard privatization of existing assets as a priority. However, in view of the huge financial needs of the power sector, more efforts need to be made to mobilize private financing. There are a number of ways that ADB might extend this involvement including:

(i) Ensuring that the enabling environment is in place to encourage private sector investment.
(ii) Encouraging sector restructuring to make utilities bankable, so that local banks and other financial institutions can become more involved in project and working capital financing.
(iii) Offering ADB private sector involvement in projects such as peaking units, hydro plants and merchant power plants, and supporting governments and utilities in developing the contracting structure for such plants.
(iv) Encouraging developments such as franchising distribution activities and contracting out of billing and debt collection to bring private sector entrepreneurs into the distribution function.
(v) Selectively supporting full privatization, particularly for thermal generation assets and in cases where significant investment in rehabilitation of plant is required.

2. Applying Commercial and Financially Sustainable Management Principles

18. There is compelling evidence to show that application of commercially and sustainable management principles can achieve many of the benefits of privatization. Successful initiatives include creating companies under local companies acts to take over the role of public corporations, recruiting managers from the private sector on term contracts, giving employees financial incentives to achieve measurable performance objectives and using merit based systems for recruitment and promotion. Further measures, such as independent directors and external independent auditors, should be more widely adopted.

19. A realistic objective for ADB is to raise accounting and auditing standards applied in the energy sector. The transition from statutory utilities to companies established under a companies act provides a good basis for doing this in that the new companies have the freedom to set their own accounting policies and processes within their framework of national legislation and could use commercial auditors. Both these developments would be positive. In the short term sector restructuring is creating some accounting and auditing problems. The establishment of new companies necessitates the splitting of accounts of former utilities between several new entities. This, in turn, requires a clean up of the accounts which is frequently time consuming. It delays completion and internal approval of accounts and may give rise to numerous audit queries which may lead to further delays. The process is beneficial, despite the delays, because it leads to more accurate accounts.

20. For utilities' accounts that are produced and audited to good local and international practice standards, covenants are useful in that they give ADB assurance over how the utility is using its funds, both those borrowed from ADB and more generally. However, for utilities where accounting and auditing fails to meet proper standards alternative approaches are needed. ADB should use covenants to require improvements in standards, for example by changes to accounting policies and procedures. Where necessary, ADB should require the appointment of accounting advisers or possibly independent auditors to address these problems.

21. There is little point in ADB focusing on strict compliance with covenants relating to the submission of audited accounts when those audits are of doubtful value. Delays in submissions should be accepted if efforts are being made to improve quality of the audited accounts. In moving forward, there is a need to find the right balance among compliance, quality capacity development, and implementation monitoring. While ADB does monitor the timely submission of audited financial statement, it is rare for ADB financial analysts to rigorously review the audit reports and to raise questions about them. This is a failure in project administration on ADB's part and raises questions why ADB required auditing of financial statements in the first place.

3. Supporting the Establishment of an Independent Regulator

22. Comprehensive, independent regulatory structures which are capable of achieving a balance between the interests of investors and consumers have played a vital role in energy sector reform. Independent regulation has promoted accountability and transparency in the power sector and has also played a role in broader reforms such as encouraging investment in renewable energy and addressing environmental concerns.

23. Independent regulation is a relatively new activity in the Asia Pacific Region and more assistance is required. Numerous issues were raised in discussions with regulators by the OEM such as the need to ensure financially competitive salaries, the scope for creating career structures for regulatory staff, meeting training needs, methods of achieving financial

independence of the regulator and means of sharing information about best practice. Dialogue between power sector regulators is a powerful tool in sharing and promoting best practice. Where there are opportunities for ADB to promote regulatory cooperation and skills development, they should be taken.

4. Supporting the Financial Restructuring of Insolvent Utilities

24. In a number of countries the power sector has been insolvent for many years and there is a culture of non payment both between utilities and from utilities to government. The power sectors in the Philippines and Bangladesh both illustrate the problem.[6]

25. The authorities in India have had success in placing the power sector on a commercial footing, following the scheme of settlement, organized in 2001/02 and involving state electricity boards, central and state governments and the Reserve Bank of India. Debts were resolved through a combination of securitization and write off. State electricity boards now keep current on their power purchases under a letter of credit scheme. Similar schemes should be evaluated in other countries with insolvent power sectors to introduce commercial discipline and encourage greater private sector involvement.

5. Encourage the Wider Adoption of Risk Management Policies and Procedures

26. In emerging markets, risk management is an essential requirement for the long term survival of all participants and risk management needs to develop simultaneously with a market structure. Future lending may shift towards non sovereign lending; hence more financial risks in addition to potential performance based risks imposed by regulators will increase for restructured utilities. ADB should ensure that risk management is part of an overall plan for market liberalization. This requires a considerable investment in time and training, the development of new software and organizational changes. It also requires considerable investments in capital for computer systems. General corporate risk management, through the requirement of a risk management committee, reporting directly to an independent board should be included in loan covenants.[7]

C. Promote Regional Co-Operation to Share Resources

27. Regional energy integration has proceeded slowly in the Asia Pacific Region, but the potential benefits have increased since 2000. First, fuel prices have increased substantially placing a greater value on sharing cross country hydroelectric resources. Second, power grids within countries are improving, ensuring that power transfers across national borders can be widely distributed within other markets. The unrealized hydro potential in Bhutan (21,000MW), Nepal (83,00MW), and Pakistan (36,00MW) is significant. Bangladesh has considerable gas and coal reserves which it uses for power generation and could use more effectively if complemented with hydro resources. The Central Asia Regional Economic Cooperation (CAREC) also has extensive surpluses of hydropower and gas which can be exported within and outside of the CAREC region.

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[6] In the Philippines, defaults by distribution cooperatives to National Power Corporation are commonplace and National Power Corporation itself is overdue on repaying many loans from central government. In Bangladesh, both Bangladesh Power Development Board and Dhaka Electricity Supply Authority have a long history of defaulting on government loans. Dhaka Electricity Supply Authority has also defaulted on payments to Bangladesh Power Development Board and more recently Power Grid Company of Bangladesh.

[7] These recommendations were implemented in a recently approved loan to Madhya Pradesh. March, 2007.

28. ADB should focus on removing the roadblocks to increased co-operation and trade in the energy sector. Regulatory, currency and trading risks and political uncertainty must be addressed. Regional cooperation on power trading has so far achieved limited success outside of GMS although there are huge opportunities. Addressing divergent national concerns can be a considerable barrier to making progress in regional cooperation in the energy sector. ADB has the potential to be a source of finance and advice as well as being an honest broker between the various parties in the region

29. The commercial case for regional linkages is also compelling and ADB should aim to involve the private sector as well as public utilities. Some major companies such as National Thermal Power Corporation, Tata and Power Trading Corporation in India, have shown an interest in investing and operating regionally. Private sector involvement has the potential to make regional cooperation a reality. These companies will readily appreciate the opportunities for improving financial performance through regional cooperation and can be expected to promote regional initiatives with their governments if it is their commercial interest.

D. Catalyze Investment Resources

30. Many ADB clients in the energy sector require financing to support development of the power sector. The funding will need to be raised from multiple sources and ADB will only be providing a small percentage of the total. However, the commitment of resources from ADB may be helpful in encouraging other investors. For example, typical IPP investors believe that there is less risk if there is a long term ADB commitment in place to support development of the sector. Newer financial products at the local level may also be required to develop local markets and reduce foreign exchange risks.

31. ADB can achieve only limited results acting on its own. Effective development of power systems requires balanced investments in generation, transmission and distribution. Policy reforms can be achieved most effectively if development partners offer consistent advice and support and coordinate their support for the different parts of the power system. ADB has worked effectively with other development partners, and in particular with the World Bank, in several countries. In the future cooperation will need to deepen, and include private sector investors because the large investment needs can only be met by a coordinated response from a number of sources. Similarly, the TA needs of a power sector being restructured are considerable and are beyond ADB's funding capacity. Cooperation with development partners and the private investment community needs to be recognized formally as a part of ADB's energy strategy.

E. Become a More Client Focused Organization

32. Increased competition by multilaterals and commercial financiers to lend to energy projects will enable DMCs to "shop around" for better products. ADB will need to respond to this challenge and other client issues by adopting a more client oriented approach. This should include developing new lending products, a more tailored approach to covenants and safeguards, a long term approach to developing appropriate responses to client needs and assuring staffing skills are appropriate to meeting these needs. Restructuring power sectors requires many years of planning and capacity building. Significant, long term involvement of ADB in the context of Country Partnership Strategies also allows ADB to build its sector knowledge and develop into a trusted advisor for energy agencies. OED findings suggest that

continuous ADB involvement in a sector increases the likelihood to the achievement of development results.

33. The study concluded that both the generation and transmission sectors, for instance in India, are capable of undertaking non sovereign lending to support their expansion needs. Furthermore there is significant potential for additional PPP projects in the region, such as the ultra mega power projects in India and Viet Nam. It is appropriate that PSOD takes a larger role to fund these sectors and to catalyze private sector funds, particularly into new area such as the transmission sector where PPPs are viable. PSOD is uniquely situated to coordinate with ADB's public sector operations, and has the expertise needed to develop the transition of the generation and transmission sectors into private sector-like operations. Current PSOD limitations on funding ceilings and staffing needs may be the primary inhibiting factors, and should be addressed as a matter of urgency.

34. This study, as well as the 2007 Report of the Eminent Persons Group to the President of the ADB[8] recognizes a need to review the locations of, the number and the skills mix of ADB's energy sector to meet the changing sector demands. This will be required to meet changing clients' needs and to meet the emphasis of the energy sector strategy.

[8] ADB. 2007. *Towards A New Asian Development Bank In A New Asia.* Manila.