

# THE WORLD BANK ASIA ALTERNATIVE ENERGY PROGRAM (ASTAE)

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## ACRONYMS AND ABBREVIATIONS

AIJ	Activities Implemented Jointly (Mechanism)
ALTENER	Alternative Energy Program of the European Commission
ASTAE	Asia Alternative Energy Program
AWEA	American Wind Energy Association
BB	Bank Budget
BMZ	<i>Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung</i> (German Federal Ministry for Economic Cooperation and Development)
BNPP	Bank-Netherlands Partnership Program
CEB	Ceylon Electricity Board
CFL	Compact Fluorescent Lamp
CG	Consultative Group
CIDA	Canadian International Development Agency
CRESP	China Renewable Energy Scale-Up Program
DANIDA	Danish Agency for Development Assistance
DfID	(U.K.) Department for International Development
DGIS	(Netherlands) Directorate-General for International Cooperation
DSM	Demand-Side Management
DSMO	Demand Side Management Office
EASEG	East Asia Energy and Mining Sector Development Unit
EASIN	East Asia Infrastructure Unit
EC	Electric Cooperative
EdL	Electricité du Laos
EE	Energy Efficiency
EGAT	Electricity Generating Authority of Thailand
EMC	Energy Management Company
EnPoGen	Energy, Poverty, and Gender Project
ESCO	Energy Service Company
ESD	Energy Services Delivery
ESMAP	Energy Sector Management Assistance Programme
EVN	Electricity of Vietnam
FTL	Fluorescent Tube Lamp
GEF	Global Environment Facility
GOC	Government of China
GRIDCO	Grid Corporation of Orissa
GTZ	<i>Deutsche Gesellschaft für Technische Zusammenarbeit</i> (German Corporation for Technical Cooperation)
GWh	Gigawatt-hour
IBRD	International Bank for Reconstruction and Development
ICR	Implementation Completion Report
IDA	International Development Association
IDF	International Development Forum
IEA	International Energy Agency
IREDA	Indian Renewable Energy Development Agency
ISO	International Organization for Standardization

kWp	Kilowatts-peak
MEA	(Thai) Metropolitan Electricity Authority
MFI	Microfinance Institution
MMS	Mandated Market Share
MNES	(Indian) Ministry of Non-Conventional Energy Sources
MW	Megawatt
MWp	Megawatts-peak
NGO	Nongovernmental Organization
NOVEM	Netherlands Agency for Energy and the Environment
PBS	Palli Bidyut Samitis (Rural Electricity Cooperatives)
PDF	GEF-Project Development Facility or Power Development Fund of Nepal Power Development Project
PHRD	Japan Policy and Human Resources Development Fund
PLN	<i>Perusahaan Listrik Negara</i> (Indonesian State Electricity Corporation)
PV	Photovoltaic
PV GAP	Global Approval Program for Photovoltaics
QuaP-PV	Quality Program for Photovoltaics
RAPSS	Remote Area Power Supply System
REAP	(Vietnam) Renewable Energy Action Plan
RERED	Renewable Energy for Rural Development Project
SASEI	South Asia Energy and Infrastructure Sector Unit
SEIER	(Vietnam) System Efficiency Improvement, Equitization and Renewables
SHS	Solar home system
Sida	Swedish International Development Cooperation Agency
TA	Technical Assistance
tce	Tons of coal equivalent
U.K.	United Kingdom
UNDP	United Nations Development Programme
US/ECRE	U.S. Export Council for Renewable Energy
US/IFREE	U.S. Internal Fund for Renewable Energy and Efficiency
US/NRECA	National Rural Electric Cooperation Association
US/NREL	National Renewable Energy Laboratory
USAID	U.S. Agency for International Development
USDOE	U.S. Department of Energy
USTDA	U.S. Trade and Development Agency
WB	World Bank
WSSD	World Summit on Sustainable Development

## 1. OVERVIEW

In 1992, the World Bank and donor partners established the Asia Alternative Energy Program (ASTAE) to support the transition to environmentally sustainable energy use in developing countries in Asia. ASTAE's strategic objective during the past decade has been to mainstream alternative energy in World Bank energy sector activities, with the aim of achieving a 10 percent share of renewable energy and energy efficiency components in World Bank energy sector projects in Asia. This strategic objective has been achieved; during the period FY98–2000 more than 12 percent of the Bank's power sector lending in Asia was for alternative energy components and projects.

With this milestone achieved, ASTAE reviewed its program strategy to ensure that its overall objectives and individual country strategies were in line with the larger business strategies of the East Asia Energy and Mining Sector Development Unit (EASEG), the new East Asia Infrastructure Unit (EASIN), and the Bank as a whole. A management review of the program was initiated in FY02 and finalized in FY03. This status report describes the outcomes of this review.

Another important event that took place in this reporting period was the World Summit on Sustainable Development, held in Johannesburg in August/September 2002. The outcomes, specifically relevant to ASTAE, are also described. Both developments will have a profound impact on shaping the future direction of ASTAE. The Consultative Group (CG) of the Energy Trust Funded Programs, which met in Berlin in April 2003, approved the conclusions of the reviewers and asked ASTAE to update its strategy. The ASTAE strategy will be finalized following the 2004 CG meeting.

### STATUS OF THE ASTAE PROGRAM

As described in the last status report, FY02 was a very good year for ASTAE with four projects approved by the World Bank Board of Directors with a total alternative energy investment of \$228 million, of which the World Bank/Global Environment Facility (GEF) would contribute \$171 million. This was 20.6 percent of total energy sector lending for the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA) to Asia in FY02. In FY03 the World Bank Board of Directors approved three projects that received ASTAE support. The total alternative energy investment of these three projects together is expected to be \$348 million, of which the World Bank/GEF will contribute \$81 million. This accounts for 19.9 percent of the total energy sector lending in Asia. Further statistical data for FY02 and FY03 is provided in Annex 1. The updated list of projects supported by ASTAE includes 6 closed projects, 20 projects under implementation, and 9 projects in the pipeline (see Annex 2 for details).<sup>1</sup>

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<sup>1</sup> Only projects that are listed as pilot projects in the World Bank "Project Portal" and which consequently have a project identification number are included in the pipeline. Two projects in India have been deleted from the pipeline. As a result of both, the number of projects in the pipeline is reduced.

The funding situation of ASTAE is still healthy. In FY03 the Canadian International Development Agency (CIDA) approved \$2.8 million in funding for ASTAE, of which the first tranche of \$1.7 million was transferred. The U.K. Department for International Development (DfID) transferred tranches 4 and 5 of the DfID Trust Fund for ASTAE. To carry out the FY03 work program, ASTAE disbursed \$2.2 million for project and program development, implementation of alternative energy projects, and capacity building. Further details are provided in this status report.

## **STATUS OF ASTAE STRATEGY DEVELOPMENT**

ASTAE program managers and donors have been considering the need for a new strategy since the ninth donor meeting in April 2000. The ASTAE Management Review and the World Summit on Sustainable Development (WSSD), both of which took place in the second half of 2002, have reactivated and revitalized this ongoing discussion, as described below.

### *Management Review*

A management review was first proposed by the EASEG following the 2002 meeting of the Consultative Group on Energy Trust Funded Programs and initiated after a new Infrastructure Department was established in the East Asia and Pacific Region. The objective of the management review was to develop a vision statement and medium-term strategy and business plan, consistent with the Bank's corporate priorities and budget constraints. The main conclusions of the management review were as follows:

- That the ASTAE program undoubtedly enabled the World Bank to promote the introduction of renewable energy and energy efficiency applications in Asia. The partnership with donors has helped increase alternative energy applications to an extent that would not have been possible within the Bank budget alone;
- That alternative energy has been mainstreamed in the Asia Region within the Bank, especially in EASEG. However, within the client countries, alternative energy applications are in general still only a fraction of the potential;
- That renewable energy and energy efficiency projects are indeed in general more expensive and that they take longer to prepare. First-time renewable energy and energy efficiency projects were in general more expensive and took longer to prepare than conventional projects because these projects required a substantial amount of capacity building across various stakeholder groups, including the private sector. ASTAE resources and, to a much greater extent, GEF resources were invaluable in meeting this critical need. When moving to more standard or routine alternative energy projects, building on earlier projects, this is not necessarily the case, as shown in the case of Sri Lanka<sup>2</sup>;
- That ASTAE should revisit the definition of alternative energy to include a wider range of clean energy services for environmental, health, and poverty alleviation objectives, in order to enhance the impact, especially on the poor;

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<sup>2</sup> The first project was expensive to prepare and took a long time because preparation also included a vast amount of capacity building. The follow-up Renewable Energy for Rural Development Project (RERED) project, which is very similar to its predecessor, was much cheaper to prepare and took only six months to prepare.

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- That ASTAE should be continued as an integral part of EASEG. ASTAE is necessary to enable the Bank to pursue alternative energy in Asia and to achieve the scale-up objectives. This will provide maximum flexibility, quick response capacity, and regional focus, which were the main elements of success of ASTAE in the first eight years; and
  - That the new objectives of ASTAE should be (a) the scale-up of the impact of alternative energy over the next five years using MW of installed electric power capacity equivalent or MW of “less clean” options avoided, and (b) the proactive introduction of energy services delivery to underserved rural and urban poor, measured in poor reached.

The conclusions and recommendations were presented and endorsed at the meeting of the Consultative Group of Energy Trust Funded Programs, which met in Berlin in April 2003.

#### *World Summit on Sustainable Development*

The WSSD, held in Johannesburg in August and September 2002, gave new impetus to global action to fight poverty and protect the environment. The agenda for sustainable development was broadened and strengthened, emphasizing particularly the linkages between poverty, the environment, and the use of natural resources. Energy was central to the negotiations and outcomes, although in the end no energy targets were adopted. The key commitments made at the summit related to energy were as follows:

- *Access to Energy.* Improve access to reliable, affordable, economically viable, socially acceptable, and environmentally sound energy services and resources, sufficient to achieve the Millennium Development Goals, including the goal of halving the proportion of people in poverty by 2015;
- *Renewable Energy.* Diversify the energy supply and substantially increase the global share of renewable energy sources in order to increase its contribution to total energy supply;
- *Energy Efficiency.* Establish domestic programs for energy efficiency with the support of the international community. Accelerate the development and dissemination of energy efficiency and energy conservation technologies, including the promotion of research and development; and
- *Energy Markets.* Remove market distortions, including the restructuring of taxes and the phasing out of harmful subsidies. Support efforts to improve the functioning, transparency, and information about energy markets with respect to both supply and demand, with the aim of achieving greater stability and ensuring consumer access to energy services.

#### *New ASTAE Strategy*

The conclusions of the management review, together with the recommendations of the WSSD, will largely form the basis for the new ASTAE strategy. Key features of the new ASTAE strategy will be (a) to extend the definition of alternative energy to include technologies addressing energy poverty in addition to renewable energy and energy efficiency; generically termed sustainable energy technologies; and (b) to scale up sustainable energy implementation by focusing on program development.

Including technologies to address energy poverty will enable ASTAE to reach a far greater number of energy-poor households than previously possible, creating a greater synergy with the poverty reduction agenda. It will also avoid the perception that ASTAE is pushing alternative energy options because they were the only options ASTAE could support. Focusing

on program development to create an enabling environment for sustainable energy investments will result in the large-scale impact required to achieve significant contributions of sustainable energy to satisfy energy needs.

In FY04 the new ASTAE strategy will be formulated, distributed widely for comments, presented at the meeting of the Consultative Group of the Energy Trust Funded Programs, and finalized.

## 2. WORK PROGRAM

In FY03 one project that received ASTAE support was closed, bringing the number of closed projects to six (two in South Asia and four in East Asia). During FY03 the World Bank Board approved 3 ASTAE-supported projects, increasing the number of ASTAE-supported projects under implementation to 20 (12 in East Asia and 8 in South Asia).

After critically reviewing the pipeline of projects under reconnaissance or preparation, a decision was made to drop a total of three projects (two in South Asia and one in East Asia), leaving just nine projects, all in East Asia, in the pipeline. The two, SASEI pipeline projects, were dropped because there was no indication that SASEI would request ASTAE support to develop these projects.<sup>3</sup> The pipeline project in East Asia was dropped because this project eventually had no alternative energy component.

The ASTAE Manager has initiated discussions with SASEI on modalities of cooperation. As a result of these discussions, it is expected that beginning in FY04 ASTAE will recommence its support to SASEI projects.

Table 1 summarizes changes in FY03 and the situation at the end of FY03. A detailed discussion is provided in the following sections. For details on the implementation status of the projects under implementation see Annex 3 and for details of the status of the projects under preparation see Annex 4. The financial details for projects in East Asia are provided in Annex 5 and for projects in South Asia in Annex 6.

**Table 1: Changes in FY03 and Status at the End of FY03**

Changes in FY03	South Asia	East Asia and the Pacific	Total
Closed	1	0	1
Approved	1	2	3
Added to pipeline	0	0	0
Deleted from pipeline	2	1	3
Status end FY03	South Asia	East Asia and the Pacific	Total
Closed	2	4	6
Under implementation	8	12	20
Pipeline	0	9	9
Total	10	25	35

<sup>3</sup> At the end of FY02, SASEI decided to disengage from the ASTAE program and no longer share the ASTAE overhead cost with EASEG. SASEI could still request ASTAE support on an "as needed" basis, like other units in nonenergy sectors.

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### PROJECTS APPROVED IN FY03

In FY03 the World Bank Board of Directors approved the projects China Energy Conservation II, Nepal Power Development, and Vietnam Demand-Side Management. These three projects are described in detail below.

#### *China Energy Conservation II (P067337)*

The board approved the GEF stand-alone China Energy Conservation II Project on October 24, 2002. This project is part of the larger China Energy Conservation Program, which includes the China Energy Conservation I project (P003606/P037859) and a number of technical assistance (TA) activities. China Energy Conservation I was successful in introducing and adapting energy performance contracting to Chinese conditions, developing a viable business model in the three energy management companies (EMCs), and developing an initial market among client enterprises. The objective of this project is to expand domestic investment in energy efficiency projects through the aggressive development of China's nascent EMC industry. The EMCs undertake energy conservation investment projects in other "host" enterprises based on "energy performance contracts." EMCs are responsible for project design, procurement, installation, financing, and energy conservation performance. Host enterprises are obliged to pay EMCs a portion of the energy savings realized (typically about 80 percent) over the tenor of the contract (typically 1–3 years) as payment for the project package. The key performance indicators for this project are (a) total energy efficiency investments generated by the EMCs, (b) the revenue paid to EMCs by host enterprises derived from and proportional to actual reductions in energy cost, and (c) reductions in carbon dioxide emissions.

The project comprises three components: (a) an EMC Service Component, designed primarily to provide TA to new and emerging EMCs on setting up and developing their businesses; (b) a Project Monitoring, Reporting, and Evaluation Component to support the coordination and evaluation work of the Project Management Office; and (c) an EMC Loan Guarantee Program, designed to provide new and emerging EMCs with enhanced opportunities to receive loans from domestic banks, and to engage banks in the development of a sustainable EMC Industry.

This project is expected to generate \$384 million equivalent energy efficiency investments over the duration of the project. Over the lifetime of the equipment (9.2 years) this is expected to save 35.3 million tce and reduce carbon emissions by 23.5 million tons.

The total project cost is \$243 million, of which the GEF provides \$26 million. No World Bank loan is involved. The GEF contribution will be used for the EMC guarantee programs (\$24 million), TA (\$6.2 million), and project management and monitoring (\$2.3 million).

ASTAE supports the larger China Energy Conservation Program through a major TA program for the EMCs. The total budget for this support is about \$2.5 million. Financial support for ASTAE to carry out this program comes from the DfID (TF027746). Initial major activities included (a) development and initial delivery of a massive and sophisticated training program for new EMCs, including an introductory course, and advanced, interactive workshops on EMC corporate development and business strategy, EMC project development and management, EMC financial management, and new and emerging business opportunities; (b) definition of the optimal long-term institutional arrangement for EMC Service Association, based in part on the operational experiences of energy service company (ESCO) associations internationally; and (c) a series of activities to raise awareness concerning the EMC industry in local banks, to help bank

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officials to understand the details of the business, and to provide EMCs with customized TA in their preparation of applications for loan finance. The Task Team Leader of this program considers the ASTAE support a vital part of the overall program.

*Nepal Power Development (P043311)*

The Nepal Power Development Project was approved on May 22, 2003. Its objectives are to: (a) develop Nepal's hydropower potential; (b) improve access of rural areas to electricity services; and (c) promote private participation in the power sector as a way to improve sector efficiency and to mobilize financing for the sector's investment requirements. The project consists of three components, namely (a) establishment of a Power Development Fund (PDF) to finance private development of small and medium-sized hydro schemes; (b) community-based village electrification through construction of microhydro systems (sizes of up to 100 kW); and (c) grid transmission and distribution improvements. Total project cost is estimated at \$133 million, of which IDA provides \$76 million, \$50 million as a credit, and \$25 million as a grant. The estimated total alternative energy investment is \$87 million, of which an estimated \$49 million comes from IDA.

The Power Development Fund will be a financing facility to be established by the government under the project. The fund will be wholly owned and operated by the government, but with administrative management contracted out to a commercial bank. The PDF will finance small hydro schemes with an aggregated capacity of about 25 MW and one medium-sized scheme of about 30 MW. In parallel with the PDF project, several TA activities have been provided by the GTZ under its Small Hydro Promotion Project, including assistance to local entrepreneurs to ensure that their investment proposals are bankable.

The Microhydro Village Electrification component will support scaling-up of community-based microhydro village electrification by developing about 2.5 to 3.0 MW of new microhydropower systems to serve some 30,000 new consumers. The component will build on the successes achieved under the Rural Energy Development Program financed by the United Nations Development Programme (UNDP). The Grid Transmission and Distribution component will support grid reinforcement and construction.

ASTAE supported the Nepal Power Development Project in its initial stage by providing inputs on Rural Electrification for the Nepal Power Sector Development Study. In addition ASTAE established the cooperation between the project and GTZ. Support provided by ASTAE was financed from the Swiss and Netherlands Trust Funds for ASTAE.

*Vietnam Demand-Side Management (P071019)*

This stand-alone GEF project was approved by the board on June 24, 2003, and is associated with the project Vietnam System Efficiency Improvement, Equitization and Renewables Project approved in FY02. The objectives of the project are (a) to develop and expand demand-side management (DSM) business programs and test new market transformation efforts within the national electric utility; and (b) develop sustainable business models and mechanisms to support energy efficiency (EE) retrofit investments in commercial and industrial facilities. This project represents the second phase of a 3- to 4-phase program covering 12 years (1998–2010). The first phase under the DSM program—supported by IDA and the Swedish International Development Cooperation Agency (Sida) under the Transmission, Distribution and Disaster Reconstruction Project—is now complete. The second phase comprises two components—a DSM component and a pilot commercial EE program. The DSM component

includes: (a) expanded time-of-use metering; (b) a pilot direct load control program; (c) the promotion of compact fluorescent lamps (CFLs); (d) Fluorescent Tube Lamp (FTL) market transformation; and (e) supporting programs and TA. The pilot commercial EE program seeks to test appropriate business models and mechanisms to catalyze a small and sustainable service market to support EE investments in Vietnam. This will be achieved by supporting a small group of commercial service providers in all phases of EE project identification, development, and implementation. The program will initially focus on private commercial buildings, hotels, other office buildings, and selected creditworthy industries capable of accessing financing on their own.

Total project cost is \$19 million, of which IDA provides \$5.2 million and the GEF \$5.5 million. The project is expected to reduce peak capacity demand by 120 MW and save 798 GWh of energy. The energy savings are to be achieved, among other ways, through the sales of 1 million CFLs and 6 million fluorescent tube lamps.

ASTAE supported preparation of this project by providing consultants and by conducting specific supporting studies.

### **PROJECTS CLOSED**

In FY03 the Sri Lanka Energy Services Delivery (ESD) project was closed. The Sri Lanka Energy Services Delivery Project was successful, although it had a slow start. A summary from the Implementation Completion Reports is given below:

#### *Sri Lanka Energy Services Delivery (P010498/P039965)*

The Sri Lanka Energy Services Delivery project received a large amount of ASTAE support during the identification, preparation, and implementation phases. The project was designed as a \$55 million project with a \$24 million IDA credit and \$5.9 million GEF grant. The project supported the establishment of 26MW renewable electricity generating capacity and provide electricity to 32,000 households using photovoltaics.

At the beginning of the project, the minihydro industry was virtually nonexistent. Only about 1 MW of privately owned minihydro capacity was available in 1997. As part of the ESD project, 31 MW of minihydro capacity has been installed through 15 subprojects. Six serious private sector minihydro developers are now active in Sri Lanka. As a result of the ESD, the cost of minihydro has come down from \$1,030 per kW of installed capacity to an average \$964 per kW. At the start of the project, three photovoltaic (PV) companies were selling 20 to 30 PV systems per month. At the end of the project, sales were up to 850 systems per month. In total, about 21,000 systems were sold during the project implementation period. Although this is less than the original target, a sustainable market for PV systems has been established. The cost came down slightly from \$11 per Wp to \$10 per Wp at the end of the project. The ESD project also supported the installation of 350 kW of village hydro systems, serving 1,732 beneficiary households. The pilot grid-connected wind farm component installed five 600 kW wind turbines.

Capacity building under the ESD included institutional strengthening of a number of institutions in Sri Lanka involved in the project. Capacity building in the Ceylon Electricity Board DSM branch included implementation of a Load Research Program and a DSM strategy, along with the design and implementation of a Code of Practice for Energy Efficient Commercial Buildings.

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Actual disbursements were somewhat lower than expected. Of the \$24 million IDA credit, \$22 million was disbursed; of the \$5.9 million GEF grant, \$5.7 million was disbursed. The actual total project cost is estimated at \$45 million instead of the \$55 million at the design stage.

### **PROJECT PIPELINE DEVELOPMENT**

Of the pipeline projects included in the FY02 ASTAE Progress Report, three projects were approved (see above), and three projects were deleted (two projects in India and the China Hubei Hydropower Development in Poor Areas). The project in China was approved by the World Bank board, but in the end it did not include a small hydro component. For the two pipeline projects in India no request for ASTAE support is expected.

### **NONLENDING ACTIVITIES AND KNOWLEDGE MANAGEMENT**

The two main nonlending activities carried out by ASTAE in FY03 were the completion of the Energy, Poverty, and Gender Project (EnPoGen) and the production of the second version of the quality training manuals developed under the Quality Program for Photovoltaics (QuaP-PV).

#### *EnPoGen*

The project “Asia Alternative Energy Policy and Project Development Support: Emphasis on Poverty Alleviation and Women” (abbreviated to EnPoGen) was a stand-alone project financed from the Bank-Netherlands Partnership Program (BNPP). The objective of EnPoGen was to obtain a better understanding of the impact of energy services on poverty alleviation and gender equity. To achieve these objectives, EnPoGen carried out three detailed country studies and developed, in cooperation with Energy Sector Management Assistance Programme (ESMAP), a methodology for monitoring and evaluating rural electrification projects. The country studies were carried out in China, Indonesia, and Sri Lanka, using both qualitative and quantitative methodologies. Although the main focus was on rural electricity, the studies addressed to some extent rural energy in general. The decision to focus on rural electricity was based on the fact that the majority of projects supported by ASTAE, designed to contribute to poverty alleviation and gender equity, dealt with rural electrification. The methodology for monitoring and evaluating rural electrification projects includes participatory assessments and socioeconomic impact studies. The need for this methodology was identified in the EnPoGen kickoff workshop, conducted in January 2000. Under EnPoGen, two background reports and a synthesis report were also prepared. The full list of reports is given in Annex 8.

The results of EnPoGen have been disseminated through a special issue of *ENERGIA News*, a newsletter for gender and sustainable energy. Further, ASTAE conducted an EnPoGen workshop in Washington in December 2002 and prepared a CD-ROM containing all the reports produced under EnPoGen. This CD-ROM has been widely distributed and is available to energy practitioners upon request or from the EnPoGen page at the ASTAE website (<http://www.worldbank.org/astae/enpogen/>).

The EnPoGen studies and reports will contribute to improving the understanding of the linkages between rural access to electricity, poverty alleviation, and gender equity, and will enable the World Bank and ASTAE to maximize the impact of rural electrification activities on poverty alleviation and gender equity.

*Follow-Up on QuaP-PV*

Another stand-alone activity financed from the BNPP was called “Mitigating Global Climate Change through the Development of a Quality Process Infrastructure for Renewable Energy Project,” QuaP-PV for short. Under this project, which was implemented from March 1999 to March 2000, four quality training manuals were prepared:

- Quality Management in Photovoltaics: Quality Control Training Manual for Manufacturers (Global Approval Program for Photovoltaics (PV GAP))
- Training Manual for Quality Improvement of Photovoltaic Testing Laboratories in Developing Countries (Florida Solar Energy Center)
- Certification for the PV Installation and Maintenance Practitioner: Manuals for Implementing Qualified Certification Programs (Institute for Sustainable Power)
- Solar Home Systems: Manual for the Design and Modification of Solar Home System Components (Netherlands Energy Research Center)

In FY03 the *Quality Control Training Manual for Manufacturers* was updated to reflect the changes in the newly issued International Organization for Standardization (ISO) 9001:2000 quality standard. The updated manual was also translated into French, German, and Spanish. The update and translations were funded by the European Commission, Directorate General Energy and Transport, in the framework of the Alternative Energy Program of the European Commission (ALTENER) Program, and the Swiss government. ASTAE also supported the updating and the production of the second edition CD-ROM. The manuals are also available on the ASTAE Internet site (<http://www.worldbank.org/astae/>).

### 3. CLIENT AND DONOR PARTNERSHIPS

In FY03 ASTAE continued its efforts to build strong client partnerships with a number of organizations throughout the Asia Region. These activities are often part of project identification, preparation, and implementation, and through the nonlending activities. As an example, ASTAE strengthened its partnership with PV GAP by supporting the updating of the PV GAP quality manual and its translation into French, German, and Spanish. Other partnerships important for the work of ASTAE are the partnerships with international nongovernmental organizations (NGOs) working on alternative energy. This can happen through a contractual arrangement or directly, through providing training materials, documents, or participation. As examples, ASTAE built and strengthened its partnership with Winrock International and the Energia network under EnPoGen.

Finally ASTAE continues to build donor partnerships. This not only takes place through meetings of the Consultative Group for the Energy Trust Funded Programs and bilateral meetings with donors, but also in client countries where ASTAE supports the establishment of donor coordination or donor information exchange groups. For example, ASTAE has supported the establishment of the renewable energy information exchange group in China, which meets roughly every six months to exchange information of the renewable energy projects supported by the different donors. The responsibility for organizing these meetings rotates among the different donors. Eight of these meetings have been held. ASTAE will seek to replicate this in other countries.

#### 2003 CONSULTATIVE GROUP MEETING

The 2003 Consultative Group (GC) meeting for the Trust Funded Programs was held in Berlin from April 28 to 30. This meeting was of particular importance to ASTAE as the results of the ASTAE Management Review were presented and endorsement was sought for strategic changes for the operation of ASTAE. In its presentation, ASTAE presented three main issues for discussion:

- Widening the definition of *alternative energy* to include addressing energy poverty;
- Keeping ASTAE in EASEG so as to serve both East and South Asia; and
- Giving ASTAE more autonomy and increase transparency in program coordination and fiduciary duties.

To tap synergies with poverty and access and for further integration of ASTAE in EASEG operations, ASTAE would benefit from extending the definition of *alternative energy* to include activities addressing energy poverty. This would increase its relevance to the Bank's mission, by allowing the least-cost solutions to energy issues, and would also remove the perception of technology push.

Experience has shown that integrating ASTAE into EASEG strengthened ASTAE's operational focus, which is considered one of the main success factors of ASTAE. Keeping ASTAE in EASEG provides maximum flexibility and enables quick response to requests for assistance from task team leaders. It also will enable a better focus on regional characteristics and will build greater knowledge and experience on the countries relevant to EASEG and SASEI.

The CG meeting heard that, because the trust fund fiduciary requirements and complexity of projects supported by ASTAE have grown, the management requirements for ASTAE have increased. Meanwhile, EASEG has been integrated into the infrastructure department (EASIN), and bank budgets have shrunk. To provide the proper level of management support for ASTAE and to fulfill the fiduciary responsibility, additional management support is required. It was proposed to provide additional management support through appointment of a coterminous ASTAE coordinator funded by donors. This would also create more autonomy of ASTAE and transparency in program coordination while maintaining operational relevance. The management tasks are expected to require 50 percent of the coordinator's time. In addition, one or two coterminous staff would be needed in headquarters to provide a mix of skills required to work on the extended ASTAE mandate.

The CG meeting accepted these proposals and EASEG management will put them into implementation in FY04.

## **4. ASTAE RESOURCES**

### **RESOURCE UTILIZATION**

ASTAE supports alternative energy initiatives at all stages of the project cycle, broadly identification, preparation, implementation, and evaluation. At the identification stage, support can be provided for identification studies or missions, or by supporting energy sector work to assess issues and options with respect to alternative energy. At the project implementation stage, ASTAE can support troubleshooting of alternative energy components. In the past, ASTAE has also supported project evaluation to draw out lessons learned and best practices from completed alternative energy projects or project components. The major part of ASTAE support, however, is devoted to support project preparation through capacity building and financing supporting studies.

The use of donor funds by ASTAE in FY03 totaled \$2.2 million (see Table 2). The use of World Bank resources, including GEF Bank Budget (BB), GEF Project Development Facility (PDF), consultant Trust Funds and the Japan Policy and Human Resources Development Fund (PHRD), totaled in FY03 \$1.7 million.

The total donor funds utilized by ASTAE since FY92 is \$19 million. Table 3 provides details on this by fiscal year and by donor. Total World Bank resource utilization on ASTAE-supported projects since FY92 totals \$13 million. Table 2 summarizes the donor and World Bank resources utilization by fiscal year.

### **RESOURCE MOBILIZATION**

ASTAE has mobilized more than \$22 million in donor resources since FY92. Table 4 provides details by fiscal year and by donor (note that the amounts refer to actual transfers and not to commitments or approvals; see also Annex 9 for further details).

**Table 2: Resource Utilization, World Bank and Donors, FY1992–2003**

	Donors <sup>2</sup>		World Bank <sup>3</sup>		Total	
	\$	%	\$	%	\$	%
FY92 <sup>1</sup>	108,000	32	226,400	68	334,400	100
FY93	827,087	66	419,100	34	1,246,187	100
FY94	1,399,635	67	688,100	33	2,087,735	100
FY95	1,309,063	56	1,046,000	44	2,355,063	100
FY96	2,057,058	56	1,618,924	44	3,675,982	100
FY97	1,705,817	59	1,197,128	41	2,902,945	100
FY98	1,617,777	59	1,126,683	41	2,744,460	100
FY99	1,782,576	61	1,156,346	39	2,938,922	100
FY00	2,627,480	63	1,524,004	37	4,151,484	100
FY01	955,281	46	1,106,035	54	2,061,316	100
FY02	2,108,541	66	1,106,035	34	3,214,575	100
FY03	2,205,111	64	1,239,633	36	3,444,744	100
Total	18,703,426	60	12,454,387	40	33,026,875	100

Notes:

- Actual expenses for the six-month period of January 1 through June 30, 1992.
- Includes the Netherlands, U.S. agencies, the New Zealand Ministry of Foreign Trade, the German Federal Ministry for Economic Cooperation and Development and the German Corporation for Technical Cooperation (BMZ/GTZ), the European Community, the International Energy Agency (IEA), the Danish Agency for Development Assistance (DANIDA), Sida, and Government of the Swiss Confederation and in-kind contributions.
- Includes World Bank/GEF Annual Discretionary Budget, Office Occupancy, Consultant Trust Funds, PHRD, International Development Forum (IDF), and PDF grants.

**Table 3: Resource Utilization by Donor Funding Source, FY1992–2003**

	Netherlands		United States <sup>2</sup>		UNDP		United Kingdom		Switzerland		Finland		Others <sup>3</sup>		Total donors	
	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%
FY92 <sup>1</sup>			108,000	100											108,000	100
FY93	436,487	53	390,600	47											827,087	100
FY94	855,535	61	433,200	31	50,900	4							60,000	4	1,399,635	100
FY95	570,563	44	606,500	46	72,500	6							59,500	5	1,309,063	100
FY96	978,496	48	521,562	25	347,000	17							210,000	10	2,057,058	100
FY97	877,032	51	612,500	36	216,285	13							—	—	1,705,817	100
FY98	669,086	41	334,576	21	459,656	28			61,915	4			92,544	6	1,617,777	100
FY99	903,941	51	491,594	28	12,733	1			322,224	18			52,083	3	1,782,576	100
FY00 <sup>4</sup>	2,545,388	97	42,147	2	—	—			39,945	2			—	—	2,627,480	100
FY01	754,710	79	42,147	4	112,514	12	30,810	3	15,100	2			—	—	955,281	100
FY02	718,110	34	42,147	2	345,902	16	879,625	42	—	—	122,757	6	—	—	2,108,541	100
FY03	1,099,586	50	—	—	213,078	10	496,568	23	—	—	312,122	14	83,757	3	2,205,111	100
<b>Total</b>	<b>10,408,934</b>	<b>56</b>	<b>3,624,973</b>	<b>19</b>	<b>1,830,568</b>	<b>10</b>	<b>1,407,003</b>	<b>8</b>	<b>439,184</b>	<b>2</b>	<b>434,879</b>	<b>2</b>	<b>557,884</b>	<b>3</b>	<b>18,703,426</b>	<b>100</b>

*Notes:*

- Actual expenses for the six-month period January 1 through June 30, 1992. Includes the U.S. Department of Energy (USDOE), U.S. Trade and Development Agency (USTDA), U.S. Agency for International Development (USAID), U.S. Export Council for Renewable Energy (US/ECRE), National Renewable Energy Laboratory (US/NREL), Sandia National Laboratory, National Rural Electric Cooperation Association (US/NRECA), U.S. Internal Fund for Renewable Energy and Efficiency (US/IFREE), and American Wind Energy Association (AWEA).
- Includes New Zealand Ministry of Foreign Trade, German BMZ.GTZ, European Community, IEA, DANIDA, Sida, the Netherlands Agency for Energy and the Environment (NOVEM), Government of Sweden, and in-kind contributions.
- In FY99 and FY00, under BNPP Trust Funds TF021717, TF021731, and TF021738, ASTAE mobilized \$1.0 million, \$0.2 million, and \$0.8 million, respectively, totaling \$2.0 million. Of these amounts, only \$0.9 million, \$0.2 million, and \$0.7 million totaling \$1.8 million were utilized; the remaining balance of \$0.2 million was returned to the respective trust funds.

**Table 4: Resource Mobilization by Donor Funding Source, FY1992–2003**

	Netherlands		United States <sup>2</sup>		United Kingdom		UNDP		Canada		Finland		Others <sup>3</sup>		Total donors	
	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%
FY92 <sup>1</sup>			108,000	100											108,000	100
FY93	1,558,288	84	289,571	16											1,847,859	100
FY94	821,140	62	345,300	26			98,750	7					60,000	5	1,325,190	100
FY95	1,497,237	64	756,400	32			35,000	1					59,500	3	2,348,137	100
FY96	—	—	509,462	46			377,100	34					210,000	19	1,096,562	100
FY97	537,522	33	720,574	45			347,763	22					—	—	1,605,859	100
FY98	226,256	19	294,537	24			287,728	24					399,335	33	1,207,856	100
FY99	3,970,000	85	474,688	10			12,733	0					209,462	4	4,666,884	100
FY00	1,354,992	86	42,147	3			—				173,570	11	—	—	1,570,709	100
FY01	—	—	42,147	2	633,368	34	848,806	45			359,166	19	—	—	1,883,487	100
FY02	1,250,000	50	42,147	2	1,214,207	48	—	—			—	—	—	—	2,506,354	100
FY03	—	—	—	—	495,682	23	—	—	1,675,141	77	—	—	—	—	2,170,823	100
<b>Total</b>	<b>11,215,434</b>	<b>50</b>	<b>3,624,973</b>	<b>16</b>	<b>2,343,257</b>	<b>10</b>	<b>2,007,880</b>	<b>9</b>	<b>1,675,141</b>	<b>7</b>	<b>532,736</b>	<b>2</b>	<b>938,297</b>	<b>4</b>	<b>22,337,719</b>	<b>100</b>

*Notes:*

1. Actual expenses for the six-month period January 1 through June 30, 1992.
2. Includes USDOE, USTDA, USAID, US/ECRE, US/NREL, Sandia National Laboratory, US/NRECA, US/IFREE, and AWEA.
3. Includes the Swiss Federation, New Zealand Ministry of Foreign Trade, German BMZ/GTZ, European Community, IEA, DANIDA, Sida, NOVEM, Government of Sweden, and in kind contributions.

**STAFFING**

In FY03, ASTAE had 12 staff members (which included Bank staff and consultants). Mr. Mohammad Farhandi, Acting Sector Director, East Asia Energy and Mining Development Sector Unit, was the ASTAE Program Manager. Supporting these individuals is a highly skilled team of alternative energy specialists, engineers, economists, and administrative staff (for further details, see Annex 10).

## 5. CONCLUSION

FY03 was a successful year for ASTAE with the approval of another three ASTAE-supported projects. Total alternative energy investment of these three projects is expected to be \$348 million, of which the World Bank/GEF will provide \$81 million.

The shrinking of the project pipeline, primarily because of the absence of any ASTAE support to put South Asia energy projects in the pipeline, is a matter of major concern. The new ASTAE manager has initiated discussions with South Asia energy on this issue, with results expected next year. ASTAE is also offering its services to nonenergy units in East and South Asia, including East Asia Urban and South Asia Environment. It is expected that these cross-sectoral initiatives will also lead to additional ASTAE-supported projects in the pipeline beginning next year.

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**Annex 1: Energy Lending Statistics FY02–03**

Lending and GEF support (million \$)		
	FY02	FY03
World Bank lending	19,519	18,513
East Asia and the Pacific	1,774	2,311
South Asia	3,508	2,919
Asia Total	5,282	5,230
Energy lending total	1,975	1,088
East Asia and the Pacific	315	254
South Asia	505	151
Asia Total	829	405
Energy as share of World Bank lending	10.1%	5.9%
East Asia and the Pacific	17.7%	11.0%
South Asia	14.4%	5.2%
Asia Total	15.7%	7.7%
Lending for alternative energy (estimated)		
East Asia and the Pacific	17.2	0
South Asia	132.9	49.2
Asia	150.1	49.2
GEF support for alternative energy		
East Asia and the Pacific	4.5	31.5
South Asia	16	0
Asia	20.5	31.5
Lending plus GEF support for alternative energy (% of energy lending)		
East Asia and the Pacific	6.9%	12.4%
South Asia	29.5%	32.7%
Asia	20.6%	19.9%

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**Annex 2: Portfolio of World Bank/GEF Loans, Credits, and Grants  
for Alternative Energy in Asia That Received ASTAE Support<sup>4</sup>**

*Closed Loans, Credits and Grants*

**1. Lao PDR Provincial Grid Integration (PGI), P004197**

This project included components for demand-side management (DSM) and institutional building. ASTAE coordinated a South–South twinning arrangement between Electricité du Laos (EdL) and *Tenaga Nasional Berhad* (the Malaysian electric utility) to provide comprehensive training in utility operations to EdL. ASTAE also helped twin EdL with Tunisia’s Agence pour la Matrise de l’Energie for training in commercial sector energy audits. Total alternative energy project cost was **\$0.9 million**, which was for 100 percent provided by the World Bank loan to support the DSM component. Board approval date: October 6, 1992. Closing date: January 31, 2000.<sup>5</sup>

**2. India Renewable Resources Development, P010410/P009583<sup>6</sup>**

ASTAE assisted in the overall design, appraisal and supervision of this project, which included PV, wind, and minihydro components totaling \$284 million in investment. The Indian Renewable Energy Development Agency (IREDA) has played a direct, as well as catalytic, role in successfully commercializing renewable energy. Renewable energy share of power generation capacity in India is now growing faster than ever before. It increased from about 0.1 percent of total generation capacity in 1992 to 3 percent in 2000. Nearly 3,000 MW of wind, small hydro, biomass, and solar photovoltaic power systems were in operation by March 2001 compared with about 100 MW in 1992. IREDA has supported additions about half this capacity, whereas the balance was financed through private sector equity, Ministry of Non-Conventional Energy Sources (MNES) support, and loans from other lenders. The project financed over 113 MW of small hydro capacity in 33 projects compared with a target of 100 MW. During this period IREDA financed an additional 155 MW of small hydro using other resources. Wind farm capacity financed under the project was 87.2 MW in 27 projects compared with 85 MW envisaged at project appraisal. During this period IREDA financed an additional 184 MW of wind power using locally mobilized resources. The PV projects that were financed totaled 2.2 MWp in 78 projects, or slightly below the target of 2.5 MWp. The products financed ranged from solar lanterns, PV irrigation pumps, and village solar power schemes to a 200 kWp grid-tied system. In addition, IREDA financed an additional 4 MWp of PV irrigation pumps with MNES assistance. A \$26 million GEF grant supported both the wind farm and PV market development components. Total Alternative Energy project cost was **\$284 million**, of which \$115 was provided from IBRD/IDA and \$26 million from the GEF. Board approval date: December 17, 1992. Closing date: June 24, 2002.

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<sup>4</sup> Information from Project Portal.

<sup>5</sup> Closing date is date of submission of ICR to Sector Board.

<sup>6</sup> IBRD/IDA project number/GEF project number.

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### 3. **Thailand Distribution System and Energy Efficiency, P004796/P004647**

This project provided support for the Electricity Generating Authority of Thailand's (EGAT's) implementation of a five-year DSM demonstration program. The project created considerable momentum in promoting efficient electricity consumption through utility-sponsored DSM programs and public education. EGAT's Demand-Side Management Office (DSMO) launched more than 17 efficiency programs for lighting, appliances, industrial-commercial buildings, and load management. The DSMO exceeded its savings target of 238 MW in load reduction by 238 percent, and achieved 566 MW in avoided capacity through improved efficiency gains. The energy savings from this program avoided an estimated 2.3 million tons of CO<sub>2</sub> emissions. Total alternative energy investment was **\$59 million**, of which the GEF provided \$9.5 million, although \$1.5 million of this was later allocated to the Thailand Metropolitan Distribution Reinforcement Project. Board approval date: April 27, 1993. Closing date: June 19, 2000.

### 4. **Indonesia Second Rural Electrification (REII), P003979**

This project provided support for the Indonesian State Electricity Corporation's (PLN's) least-cost rural electrification program, which included renewable energy generation components. Among the objectives of the project was the establishment of incentives for private sector and local cooperatives to take an increasingly larger share of rural energy distribution and renewable energy development within the framework of a least-cost rural energy master plan. ASTAE supervised the preparation, appraisal, and supervision of the small geothermal and grid-connected minihydro components. Private participation in small power generation was supported by the issuance of regulations and letters of awards, announcement of purchase tariffs, but the financial crisis in 1997 prevented further progress. The minihydro projects (7.8 MW) were commissioned at about 14 percent below estimated cost. PLN prepared additional minihydro and minigeothermal projects with an aggregate capacity of about 30 MW for future assistance, but no follow-up investment was made on account of the negative impact of the financial crisis. Total alternative energy investment was **\$19 million**, of which IBRD/IDA provided \$13 million. Board approval date: February 28, 1995. Closing date: September 11, 2000.

### 5. **Vietnam Power Development, P042236**

This project supported the development of new gas-fired generator at Phu My and augmentation of transforming capacity to meet the electricity needs of Vietnam. ASTAE assisted in the preparation of Terms of Reference for a Rural Electrification Master Plan that included renewable energy technologies and assisted in the supervision of the Master Plan's preparation. Total alternative energy investment was \$1.6 million, of which IBRD/IDA support was \$0.5 million. Board approval date: February 20, 1996. Closing date: June 30, 2000.

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*N.B.* The portfolio of ASTAE-supported projects does not include projects that have been canceled or dropped. The Asia financial crisis had a severe impact on lending operations in Indonesia, forcing the cancellation of two projects under implementation (the Sumatra and Kalimantan Power and the Renewable Energy for Small Power Projects) and three projects under preparation (Eastern Indonesia Renewable Energy Development Project, Eastern Islands Power Sector Development Project, and the Sumatra, Kalimantan Sulawesi Rural Electrification Project). The Henan (Qinbei) Thermal Power Project in China, which included an energy efficiency component, was canceled shortly after loan approval. The Philippines Renewable Energy Isolated Grids AII project is no longer being implemented by the Bank. Four projects in India were also dropped in FY01. These are the Solar Thermal Project (no longer implemented by the Bank), UP Power Sector Restructuring APL, Haryana Power Sector Restructuring APL II, and Calcutta Urban Water Supply Project.

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6. **Sri Lanka Energy Services Delivery (ESD), P010498/P039965**

An ASTAE staff member task managed this project on a cross-support basis during the first years of effectiveness. The project encouraged the provision of grid and off-grid energy services using renewable energy and DSM investments. The project included an ESD Credit Program Component to help finance investments by the private sector, NGOs, and cooperatives in off-grid photovoltaics and village hydro schemes, of grid-connected minihydro sites and other renewable energy applications. The other components were (a) a grid-connected Pilot Wind Farm executed by the Ceylon Electricity Board (CEB) and (b) TA to the CEB to strengthen its capacity to help ESD Credit Program subproject developers and to undertake DSM activities, including DSM program design and implementation, load research, and an energy-efficient building code. Total alternative energy investment (actual) was **\$45 million**, of which \$22 million came from IBRD/IDA, while \$5.7 million was provided by the GEF. Board approval date: March 18, 1997. Closing date: May 6, 2003.

*Loans, Credits and Grants under Implementation*

7. **India Orissa State Power Sector Restructuring, P035170**

ASTAE staff assisted in the preparation of a DSM component in the state's power sector reform program and are now supervising implementation of this component. A DSM cell has been set up within the Grid Corporation of Orissa (GRIDCO) to facilitate load research and DSM program development. DSM investments include municipal water pumping and storage systems, motor rewinding and motor efficiency programs, load research linked to a proposed metering program, and various DSM opportunities in the industrial, residential, commercial, and agricultural sectors. The DSM component was restructured during implementation, and total Bank support for the DSM component is **\$10 million**.<sup>7</sup> Board approval date: May 14, 1996; closing date: January 31 2004

8. **Indonesia Solar Home Systems (SHSs), P035544/P003700**

ASTAE assisted in the design of this project, which supported solar home system investments funded and/or implemented by the private sector, NGOs, and cooperatives. Within the framework of a least-cost rural electrification strategy, the project supported investments in solar home systems to areas not expected to receive grid-connected electrical services for at least three years. Components included TA for developing energy strategies and strengthening institutional capacities. Because of the Asia financial crisis, the scope of the project was substantially reduced. Total alternative energy investment (actual) is expected to be **\$3.4 million**, of which \$0.1 million came from IBRD/IDA and \$2.3 million from the GEF. Board approval date: January 28, 1997. Closing date loan: July 24, 2001. GEF grant will be closed in FY04.

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<sup>7</sup> In December 2002 the DSM component was further restructured to focus solely on metering.

9. **Thailand Metropolitan Distribution Reinforcement, P037086**

This Bank-assisted project sought to meet the anticipated growth in demand during 1997–2001 by improving system reliability and restructuring the Metropolitan Electricity Authority (MEA) in preparation for its commercialization and corporatization. ASTAE assisted in the preparation and is supervising the DSM component, which includes the creation of an appliance-testing laboratory, load research, load control and energy service company (ESCO) development. Total alternative energy project cost is **\$4.0 million** of which \$1.5 million is a grant from EGAT's Project allocated to MEA to support this program. Board approval date: June 24, 1997. Expected closing date: December 31, 2003.

10. **Vietnam Transmission, Distribution, and Disaster Reconstruction, P045628**

The project financed the expansion of transmission systems in south and central Vietnam, and rural electrification in selected areas. The Swedish Sida-supported DSM component consisted of TA to prepare a DSM policy and regulatory framework, load management program, and energy efficiency standards and codes. The total alternative energy project cost is **\$3.3 million**, of which Sida committed \$2.8 million. Board approval date: January 20, 1998. Expected closing date: December 31, 2003.

11. **Lao PDR Southern Provinces Rural Electrification, P044973**

The project focuses on the expansion of rural electrification in southern and central Laos. ASTAE is assisting in the supervision of a renewable energy component, which includes investments for off-grid electrification in photovoltaics and microhydro. Bank/GEF support for this project is \$35 million, with an alternative energy component of **\$2.2 million**, of which IBRD/IDA provides \$1.0 million and the GEF provides \$0.7 million. Board approval date: March 17, 1998. Expected closing date: June 30, 2004.

12. **China Energy Conservation, P003606/P037859**

This project is designed to introduce, demonstrate, and disseminate new project financing concepts and market-oriented institutions to promote and implement energy efficient measures in China. ASTAE is assisting in the supervision of this project. Under this project Energy Management Companies (EMCs) have been established to implement largely industrial efficiency projects through performance contracts. The project also supports the national energy conservation dissemination center. Total alternative energy project cost is **\$151 million**, of which \$63 million is provided by IBRD/IDA and \$22 million by the GEF. Board approval date: March 26, 1998. Expected closing date: June 30, 2006.

13. **India Andhra Pradesh Power Sector Restructuring, P049537**

ASTAE contributed to this project by implementing a linked integrated agricultural DSM activity financed under the activities implemented jointly (AIJ) mechanism. This activity includes improvements in distribution system efficiency, metering, and end-use efficiency improvements in irrigation systems. Total cost of the alternative energy component was \$4.6 million, which came from the Government of Norway. Board approval date: February 18, 1999. Expected closing date: December 31, 2002.

14. **China Renewable Energy Development, P046829/P038121**

This stand-alone renewable energy project is supporting the accelerated development of renewable energy resources. The project includes 20 MW of wind farms and ~10MW of solar home systems, plus a PV technology development component. Total alternative energy investment (after restructuring) is **\$205 million**, of which IBRD/IDA will provide \$13 million and the GEF \$27 million. Board approval date: June 8, 1999. Expected closing date: June 30, 2007.

15. **Vietnam Rural Energy I, P056452**

This project provides energy to about 450,000 households in 32 provinces in rural Vietnam. The project includes TA components to develop institutional capacity and policy frameworks to encourage the use of renewable energy to supplement grid supply or serve isolated communities where renewables are the least-cost option. Total support for alternative energy is **\$2.5 million**. The World Bank Group is financing \$2.2 million through ASTAE, the IFC, PHRD, ESMAP, and the Swiss consultant trust fund. New Zealand is cofinancing \$0.3 million in alternative energy costs. Board approval date: May 30, 2000. Expected closing date: June 30, 2004.

16. **China Hebei Urban Environmental, P045910**

The Hebei Urban Environment Project aims to provide a safe environment and to sustain the long-term economic growth of urban areas in Hebei Province. It supports Hebei Province in implementing a long-term urban environmental services improvement program to recover from environmental degradation of its water and land resources, provide an adequate supply of safe water, and ensure sustainability of delivery through institutional and financial reforms of the service utilities. ASTAE was involved in developing the energy efficiency component relating to wastewater utilities as part of this project. The total alternative energy project value is **\$5.0 million**, of which \$4.0 million comes from IBRD/IDA. Board Date June 27, 2000. Expected closing date: June 30, 2007.

17. **India Renewable Energy II/Energy Efficiency, P049770/P055906**

This project is a follow-up to the first Renewable Resources Development Project and expands support for the small hydro program beyond the southern region to include other states in India. The project also provides support for IREDA to promote and finance energy efficiency investments and foster the development and operation of energy service companies. The total alternative energy project cost is **\$300 million**, of which IBRD/IDA provides \$130 million (\$80 million IBRD Loan, \$50 million in IDA assistance), and a GEF grant of \$5.0 million. Board approval date: June 27, 2000. Expected closing date: March 31, 2006.

18. **India Rajasthan Power Sector Restructuring, P038334**

This project is directly supporting the implementation of the power sector reform program in the state of Rajasthan in order to improve the efficiency of electricity service and enable the sector to gain access to capital markets and commercial financing. ASTAE is assisting in the design of the DSM component comprising TA for DSM and load research. Total alternative energy project cost is **\$2.0 million** provided by USAID to cofinance a DSM TA component. Board approval date: January 18, 2001. Expected closing date: June 2005.

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19. **China Passive Solar Heating for Rural Health Clinics, P070161**

This GEF project strengthened the capacity of architectural and engineering design institutes in China to design and build energy-efficient passive solar buildings. The project funded the incremental cost of constructing passive solar heating in 29 township health centers that were built or renovated under the ongoing Basic Health (Health XIII) project (P003566). Energy savings and service improvements in these demonstration clinics have been evaluated, and this experience will be disseminated within the health sector and to other sectors. This project was designed on the basis of a pilot project implemented by ASTAE in 1999–2001 under the ASTAE Renewable Energy and Energy Efficiency Application Program (REAP—TF021717), funded by the Government of the Netherlands from the BNPP program. GEF support for this project is **\$0.8 million**. Board date: June 21, 2001. Expected closing date: December 31, 2003.

20. **India Uttar Pradesh Water Sector Restructuring, P050647**

The project aims to set up an enabling institutional and policy framework for water sector reform, as well as to increase and sustain water and agricultural productivity. This project is expected to include canal-based hydro components. Total alternative energy project cost is **\$40 million**, of which \$35 million is provided by IBRD/IDA. Board date: February 19, 2002. Expected closing date: October 31, 2007.

21. **Bangladesh Rural Electrification and Renewable Energy Development, P071794/P074040**

The project supports the government's efforts to find meaningful and sustainable solutions to meet the challenge of rural development. The grid component of the project supports (a) line expansion and intensification in areas currently under the Palli Bidyut Samitis (PBSs) (Rural Electricity Cooperatives); (b) distribution area rationalization and rehabilitation of networks in new areas taken over by the PBSs; (c) TA for Rural Electrification Board/PBS institutional development, financial restructuring, socioeconomic program and poverty reduction aspects of electricity provision; and (d) development of the small power generation program. The off-grid component supports (a) financing and subsidy mechanisms for solar home systems through PBSs, NGOs, and microfinance institutions (MFIs); (b) financing Remote Area Power Supply System RAPSS); (c) TA for promotion of solar home systems and development of RAPSS and (d) TA for development of pilot wind and microhydro projects. Total project cost is \$187 million, of which **\$30 million** is for alternative energy. IDA support is \$142 million and GEF \$8.0 million. Board date: June 25, 2002. Expected closing date: June 30 2008.

22. **Vietnam System Efficiency Improvement, Equitization and Renewables (SEIER), P066396/P073778**

This project includes renewable energy and energy efficiency components. The project supports Phase 1 of the Renewable Energy Action Plan (REAP) developed jointly by Electricity of Vietnam (EVN) and the Bank, and adopted by the Ministry of Industry. ASTAE supported preparation of the action plan. SEIER supports renewable energy policy development, pilot community-scale microhydro, development of grid-connected small power producers, and rehabilitation of small hydro facilities owned by EVN. Total alternative energy investment is **\$25 million**, of which IBRD/IDA provides \$17 million and the GEF \$4.5 million. Board date: June 25, 2002. Expected closing date: December 31, 2007.

23. **Sri Lanka Renewable Energy for Rural Economic Development, P076702/P077761**

The objectives of the new Renewable Energy for Rural Development Project (RERED) are (a) to expand commercial provision and utilization of renewable energy and (b) to pursue economic development and improvement in quality of life through more productive and efficient use of rural energy resources. It adopts the successful concept of the closed ESD project while pursuing broader goals, namely, increasing access of the poor to rural electricity, utilizing electricity as a means to further income generation and social objectives, and expanding the scope to include other rural energy resources and objectives. The strengths of the concept—community ownership and operation of village hydro assets, private sector– and microfinance-based model for solar energy, and private sector model for grid connected minihydro schemes—will be retained. Total project cost is **\$134 million**, of which IDA is \$75 million and GEF is \$8.0 million. Board date: June 20, 2002. Expected closing date: June 30, 2008.

24. **China Energy Conservation II, P067337**

This project is a follow-up to the China Energy Conservation I Project, Loan 4304-CN. The first phase project efforts have been successful so far in introducing and adapting energy performance contracting to Chinese conditions, developing a viable business model in the three EMCs (ESCOs), and developing an initial market among client enterprises. The objective of the proposed Phase II project is to expand the EMC market in China by establishing a loan guarantee facility and national EMC association. Total project cost is **\$243 million**, of which the GEF support is \$26 million. Board date: October 24, 2002. Expected closing date: December 31, 2009.

25. **Nepal Power Development, P043311**

This project supports private development of small hydro schemes, the scaling-up of community-based rural electrification through microhydro development, and improvement in transmission and distribution facilities of the Nepal Electricity Authority. ASTAE supported this project in the early development stage by preparing a report on rural energy, by funding preparation of a report on the feasibility of small hydro, and by establishing contacts with GTZ, one of the project collaborators. Total project cost is \$133 million, of which \$50 is an IDA credit and \$25 million is an IDA grant. The alternative energy component is **\$87 million**. Board date: May 22, 2003. Expected closing date: June 30, 2009.

26. **Vietnam Demand-Side Management, P071019**

This GEF project, associated with the SEIER project, would contribute to the overall energy sector development strategy by introducing load management and energy efficiency options to complement the significant investment requirements on the supply side necessary to meet the country's fast-growing electric power requirements. This would be achieved by implementing four large-scale DSM programs within the national electric utility, Electricity of Vietnam, and helping energy service companies to support energy efficiency retrofit investments in commercial and industrial facilities. The project will lead to more than 120 MW in peak load reduction and total energy savings of 798 GWh over the implementation period and help mitigate the effects of ongoing electricity tariff reforms. The proposed project represents the second phase of a longer, programmatic effort to support DSM and energy efficiency programs to achieve reductions in energy consumption and peak power demand in Vietnam. Total project cost is **\$19 million** with a GEF cost of \$5.5 million. Board date: June 24, 2003. Expected closing date: June 30, 2007.

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### *Loans, Credits and Grants in the Pipeline*

#### A. **Philippines Rural Power, P066397/P072096**

This project will support rural electrification efforts in the Philippines over a 10–15 year period. The core investment component of the proposed APL1 will develop and implement new public-private partnership business models for decentralized electrification as well as improved energy efficiency in existing rural cooperatives. Total alternative energy investment is estimated at **\$16 million**, of which \$6.7 million is for stand-alone renewable energy based electricity generation. The balance is for capacity building and partial risk guarantees. IBRD/IDA provides \$3.0 million while the GEF provides \$10 million (\$9.0 million from the World Bank and \$1.0 million from the UNDP). Estimated Board date: FY04.

#### B. **Cambodia Rural Electrification and Transmission, P064844**

This project will support renewable energy activities as an integral part of the government's rural electrification program. It will help to strengthen the country's policy and legal framework and to build capacity of various stakeholders. The investment comprises two parts: (a) investment in grid-connected small hydro and (b) off-grid systems (village hydro and solar). Total alternative energy investment is estimated at **\$32 million**, of which IBRD/IDA will provide \$28 million and the GEF \$5.8 million. Estimated Board date: FY04.

#### C. **Vietnam Rural Energy II, P074688/P080074**

The objective of the proposed project is to improve access to high-quality, affordable electricity services to rural communities. This will be achieved by repairing and maintaining existing rural power networks in about 1,000 communes, by connecting about 200 new communes to the grid, and by extending community-based renewable energy grids in about 100 communes in remote and isolated areas. An IDA loan of \$220 million is foreseen. This project will be supported by a GEF grant. The estimated support for alternative energy component is **\$40 million**. Estimated Board date: FY05.

#### D. **Philippines Power System Loss Reduction, P066532**

This stand-alone GEF project would achieve significant and sustained energy efficiency improvements in the Philippines' rural electric cooperative (EC) subsector in order to provide current and prospective EC customers with reliable and least-cost power supply. The project would pilot the use of investment management contracts to attract private investors to manage and operate selected ECs under long-term, performance-based contracts, and to mobilize private finance without recourse to the government. For those ECs that are not able to attract private investors, access to affordable commercial term loans would be facilitated through partial loan guarantees. TA would further facilitate the management improvement and investment processes. Total project costs would be about **\$63 million** with a GEF cost of about \$12 million. Estimated Board date: FY04.

**E. Thailand ESCO Development, P065972**

This project will seek to overcome barriers to expanded commercial financing of energy efficiency projects in Thailand. The project would develop financial schemes, using a blend of GEF, Thai Energy Conservation Fund, and commercial bank funds to provide affordable project financing for energy efficiency projects. It would also promote the development of ESCOs to bridge the gap between banks and energy end users. Estimated GEF support for this stand-alone project will be about **\$15 million**. Estimated Board date: FY05.

**F. Lao Southern Provinces Rural Electrification II, P075531/P080054**

This project will help the government to achieve its electrification goals of 60 percent by 2005, 70 percent by 2010, and 90 percent by 2020. The project will directly support this goal through connection of an additional 50,000 to 75,000 households to the grid and about 18,000 households through connection to off-grid sources of power utilizing solar, village hydro, diesel gensets, or other minigrid options. The proposed credit to implement the project is \$19 million for on-grid electrification, \$2.5 million for off-grid electrification, \$1.5 million for DSM, and \$2.0 million for sector reform. GEF support is expected to be \$4.0 million. Total project cost is estimated at \$35 million. Estimated Board date: FY05.

**G. China Heat Reform and Building Efficiency, P072721**

Chinese buildings consume three times as much energy for space heating as buildings in Western countries in comparable climatic conditions. The China Building Energy Efficiency and Heat Reform Project will develop recommended actions to be taken by national and local institutions to effectively accelerate the transformation of (a) markets for energy efficient building materials and products and (b) district heat pricing, metering, and billing in major urban areas in China's Heating Zone. Estimated Board date: FY04.

**H. Mongolia Delivery of Infrastructure Services, P085265**

This project entered the preparation pipeline late in FY02. This project will support the Government of Mongolia's efforts to develop private-public partnerships that will result in rural infrastructure investment, especially in renewable energy applications and improved energy efficiency in the rural distribution system. Estimated level of IBRD/GEF support is **\$20 million**. Estimated Board date: FY05.

**I. China Renewable Energy Scale-Up Program (CRESP), P067625/P067828**

The CRESP aims to support the Government of China (GOC) Renewable Energy Program in the 10th and 11th Five-Year Plans. The objective would be to reduce environmental emissions from coal-fired power generation by developing sustainable commercial markets for electricity from renewable energy. This would be done by implementing a policy to create a mandated large-scale market and programs aiming to reduce costs for mature technologies, such as wind farms, small hydroelectricity, and biomass. Estimated Bank/GEF support for this long-term program will be **\$240 million**. The GEF Project Brief was approved in May 2001. Estimated Board date: FY05.

### Annex 3: Alternative Energy Investment Projects Supported by ASTAE

Alternative Energy Projects	FY92	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01	FY02	FY03	Forecast FY04
1) Lao DPR Provincial Grid Integration		0.9											
2) India Renewable Resources Development*		141											
3) Thailand Distribution System and Energy Efficiency*		14											
4) Indonesia Second Rural Electrification				13.3									
5) Vietnam Power Development					0.5								
6) Sri Lanka Energy Services Delivery*						27.8							
7) India Orissa State Power Sector Restructuring					10								
8) Indonesia Solar Home Systems*						2.4							
9) Thailand Metropolitan Distribution Reinforcement						—							
10) Vietnam Transmission, Distribution and Disaster Reconstruction							—						
11) Lao PDR Southern Provinces Rural Electrification							1.7						
12) China Energy Conservation*							85						
13) India Andhra Pradesh Power Sector Restructuring								—					
13) China Renewable Energy Development*								40					
14) Vietnam Rural Energy I									2.2				
15) China Hebei Urban Environment									4				
16) India Renewable Energy II/Energy Efficiency*									135				
17) India Rajasthan Power Sector Restructuring									—				
18) China Passive Solar Heating for Rural Health Clinics									0.75				
19) India Uttar Pradesh Water Sector Restructuring										35			
20) Bangladesh Rural Electrification and Renewables Development										31			
21) Vietnam System Efficiency Improvement, Equitization and Renewables										21.7			
22) Sri Lanka Renewable Energy for Rural Economic Development										83			
23) China Energy Conservation II											26		
24) Nepal Power Development											49		
25) Vietnam Demand-Side Management											5.5		
Total Bank/GEF Support for Alternative Energy		155.9	0	13.3	10.5	30.2	86.7	40	141.2	0.75	170.7	80.5	TBD
Total Power Sector Lending in Asia		1720	1279	1633	2383	1155	1142	310	750	660	829	405	TBD
Alternative Energy Lending/Power Sector Lending (%)		9.1	0	0.8	0.4	2.6	7.6	12.9	18.8	0.1	20.6	19.9	TBD

Key \* Denotes GEF Support  
 Numbers Million \$

Reconnaissance  
 Preparation

Approval  
 Supervision

Completion

### Annex 4: Alternative Energy Pipeline Projects Supported by ASTAE

Alternative Energy Projects	FY98	FY99	FY00	FY01	FY02	FY03	Forecast FY04	Forecast FY05
A) Philippines Rural Power *		Reconnaissance		Preparation			12	Supervision
B) Cambodia Rural Electrification and Transmission *		Reconnaissance	Preparation				34	Supervision
C) Vietnam Rural Energy II		Reconnaissance		Preparation				40
D) Philippines Power System Loss Reduction				Reconnaissance	Preparation		10	Supervision
E) Thailand ESCO Development	Reconnaissance	Preparation						10
F) Lao Southern Provinces Rural Electrification II		Reconnaissance		Preparation				8
G) China Heat Reform and Building Efficiency				Preparation				18
H) Mongolia Delivery of Infrastructure Services				Reconnaissance	Preparation			20
I) China Renewable Energy Scale-Up Program		Reconnaissance		Preparation				80
Total Bank/GEF Support for Alternative Energy							56	176

Key

\* Denotes GEF Support

Numbers million \$

Reconnaissance

Preparation

Approval

Supervision

### Annex 5: ASTAE Supported Investment Projects—East Asia and the Pacific

Country	Projects	Approval— (estimated) end date	Cost in million of dollars						Primary project component	
			Total alternative energy project cost	Source of financing						
				IBRD/ IDA	GEF	Govt.	Private	Other		
Closed projects										
1	Lao	Provincial Grid Integration	10/92–1/00	0.9	0.9					DSM, institution building
2	Thailand	Distribution System and Energy Efficiency	4/93–6/00	59.3		8	20.3		31	DSM, capacity building
3	Indonesia	Second Rural Electrification	2/95–9/00	19.3	13.3		6			Minihydro, geothermal resource assessment and TA
4	Vietnam	Power Development	2/96–6/00	1.6	0.5				1.1	Renewable energy capacity building
Projects under implementation										
5	Indonesia	Solar Home Systems	1/97–YF04	3.4	0.1	2.3		1		Solar home systems and TA
6	Thailand	Metropolitan Distribution Reinforcement	6/97–FY04	4			2.5		1.5	DSM management capacity building
7	Vietnam	Transmission, Distribution and Disaster Reconstruction	1/98–FY04	3.3			0.5		2.8	DSM capacity building, equipment standards
8	Lao	Southern Provinces Rural Electrification	3/88–FY04	2.2	1	0.7	0.5			Solar battery charging and microhydro projects
9	China	Energy Conservation	3/98–FY06	150.8	63	22	7	54.3	4.5	Energy efficiency, TA
10	China	Renewable Energy Development	6/99–FY07	205.4	13	27		165.4		Wind farms, photovoltaics, PV technology improvement
11	Vietnam	Rural Energy I	5/00–FY04	2.5	1				1.5	Renewable energy TA & pilot minihydro
12	China	Hebei Urban Environment	6/00–FY07	5	4		1			Energy efficiency in water utilities
13	China	Passive Solar Heating for Rural Health Clinics	6/01–FY04	1.5		0.75	0.75			Energy efficient building design
14	Vietnam	System Efficiency Improvement, Equitization and Renewables	6/02–FY08	24.5	17.2	4.5	2.8			Renewable energy and DSM
15	China	Energy Conservation II	10/02–FY10	242.5		26		216.5		ESCO market development
16	Vietnam	Demand Side Management	6/03–FY07	18.6		5.5	1.21	6.65	5.2	DSM support
Total projects completed or under implementation				744.8	114	96.75	42.56	442.85	47.6	
Country	Projects	Expected Board approval	Estimated alternative energy project cost	Estimated WB/GEF/PCF financing	Primary project component					
Projects under preparation										
17	Philippines	Rural Power	FY04	24	12	Renewable energy for rural applications				
18	Cambodia	Rural Electrification and Transmission	FY04	17	11	Renewable energy for rural applications				
19	Vietnam	Rural Energy II	FY05	70	40	Renewable energy for remote communities				
19	Philippines	Power System Loss Reduction	FY04	30	12	Energy efficiency in rural cooperatives				
20	Thailand	ESCO Development	FY05	100	15	ESCO market development and financing				
21	Lao	Southern Provinces Rural Electrification	FY05	35	8	Renewable energy for rural application				
22	China	Heat Reform and Building Efficiency	FY04	18	18	Energy efficiency				
23	Mongolia	Delivery of Infrastructure Services	FY05	30	20	Renewable energy and energy efficiency				
24	China	Renewable Energy Scale-Up Program	FY05	128	89	Implementation of Mandated Market Share				
Total projects under preparation			452	225						
Total projects completed, under implementation and under preparation			1196.8	435.75						

### Annex 6: ASTAE Supported Investment Projects—South Asia

Country	Projects	Approval– (estimated) end date	Cost in million of dollars					Primary project component		
			Total alternative energy project cost	Source of financing						
				IBRD/ IDA	GEF	Govt.	Private		Other	
<i>Closed projects</i>										
1	India	Renewable Resources Development	12/92–6/02	284	115	26	17	72	54	Small hydro, wind farms, photovoltaics, and TA
2	Sri Lanka	Energy Services Delivery	3/97–5/03	44.6	22.1	5.7	1.9	14.9		SHS, village and microhydro, pilot wind farms, DSM
<i>Projects under implementation</i>										
3	India	Orissa State Power Sector Restructuring	5/96–YF04	10	10					DSM, metering
4	India	Andra Pradesh Power Sector Restructuring	2/99–FY04	4.6					4.6	Energy efficiency agricultural pump sets
5	India	Renewable Energy II/Energy Efficiency	6/00–FY06	300	130	5	25	140		Energy efficiency, minihydro and TA
6	India	Rajasthan Power Sector Restructuring	1/01–FY05	2					2	TA for DSM/EE for privatized distribution companies
7	India	Uttar Pradesh Water Sector Restructuring	2/02–FY08	40	25				15	Canal based small hydro
8	Bangladesh	Rural Electrification and Renewable Energy Development	6/02–FY08	30.2	16.4	8	5.8			Off-grid renewables
9	Sri Lanka	Renewable Energy for Rural Economic Development	6/02–FY08	133.7	75	8	0.8	49.9		Renewable energy in rural areas
10	Nepal	Power Development	5/03–FY09	86.8	49.2		9.8	24.7	3.1	Mini- and microhydro
Total projects completed or under implementation				935.9	442.7	52.7	60.3	301.5	78.7	

**Annex 7: Estimated Alternative Energy Impact**  
**Total Renewable Power Capacity Installed and Avoided in World Bank/GEF-Assisted**  
**Alternative Energy Investment Projects/Project Components in Asia**  
**(Projects with Board Approval Date between FY1993 and FY2003)**

		<b>Renewable energy installed (MW)</b>	<b>Number off-grid households provided access (‘000s)</b>
	<b>Renewable energy projects</b>		
Bangladesh	Rural Electrification and Renewable Energy	Neg.	65
China	Renewable Energy Development	30	350
Indonesia	Second Rural Electrification	7.8	
	Solar Home Systems	10	70
India	Renewable Resources Development	202	45
	Renewable Resources II/Energy Efficiency	200	
	Uttar Pradesh Water Sector Program		
Laos	Southern Provinces Rural Electrification	0.3	4.6
Nepal	Power Development	23	47
Sri Lanka	Energy Services Delivery	28	20
	Renewable Energy for Rural Economic Dev.	85	100
Vietnam	SEIER	5	10
	Rural Energy	TA	TA
<b>Totals:</b>		<b>591.1</b>	<b>711.6</b>
	<b>Energy efficiency projects</b>		
			<b>Capacity avoided (MW)</b>
China	Energy Conservation		n.a.
	Passive Solar Heating for Rural Health Clinics		n.a.
	Energy Conservation II		n.a.
India	Andhra Pradesh Integrated Agricultural DSM		8
	Renewable Energy II/Energy Efficiency		13
	Rajasthan Power Sector Restructuring Project		TA
Sri Lanka	Energy Services Delivery		18
Thailand	Promotion of Electrical Energy Efficiency		558
	Metropolitan Distribution (MEA)		TA
Vietnam	Transmission, Distribution and Disaster		TA
	Reconstruction		
	SEIER		120
	DSM and Energy Efficiency		120
<b>Total Capacity Avoided:</b>			<b>837</b>

n.a. Not applicable (projects will displace coal in heating applications).

Neg. Negligible.

TA Technical assistance only.

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**Annex 8: Publications in FY03**

<b>Papers and Reports Published by ASTAE or through ASTAE-funded Initiatives During FY03</b>	
GOC/WB/GEF China Renewable Energy Scale-Up Program (CRESP) Structured Brainstorming Workshop on MMS Options Report. Enno Heijndermans. February 2003.	
Papua New Guinea: Rural Electrification Policy and Strategy Development. Rural Electrification Workshop Report. Port Moresby, Papua New Guinea. April 22–23, 2003. May 2003 (sponsored jointly by ESMAP and ASTAE).	
Quality Program for Photovoltaics. Four Quality Manuals. Second edition, 2003 (available on CD-ROM).	
1	Quality Management in Photovoltaics: Quality Control Training Manuals for Manufacturers (PV GAP)
2	Training Manual for Quality Improvement of Photovoltaic Testing Laboratories in Developing Countries (FSEC)
3	Certification for the PV Installation and Maintenance Practitioner: Manual for Implementing Qualified Certification Programs (ISP)
4	Solar Home Systems: Manual for the Design and Modification of Solar Home Systems Components (ECN)
Energy, Poverty, and Gender (EnPoGen). Nine Reports. 2003. (available on CD-ROM)	
1	Enabling Equitable Access to Rural Electrification: Current Thinking on Energy, Poverty and Gender. Elizabeth Cecelski (EED).
2	Major Activities and Actors in Energy, Poverty and Gender. Anja Panjwani and Elizabeth Cecelski (Energia).
3	A Review of the Evidence and Case Studies in Rural China (IDS).
4	Impact of Rural Electrification on Poverty and Gender in Indonesia. Gérard Madon (Marge). Volume 1: Facts, Analysis and Recommendations. Volume 2: Quantitative Survey Methodology, Design and Frequency Results.
5	Impact of Rural Electrification on Poverty and Gender in Sri Lanka. René Massé (Marge).
6	Monitoring and Evaluation in Rural Electrification Projects: A Demand-Oriented Approach (Winrock, World Bank, Mallika Consultants; sponsored jointly by ESMAP and ASTAE).
7	Rural Electrification in Indonesia and Sri Lanka: From Social Analysis to Reform of the Power Sector. Michel Matly (Marge).
8	Energy, Poverty and Gender. A Synthesis. K.V. Ramani and Enno Heijndermans.
9	EnPoGen: Operationalising Gender and Poverty. Special Issue of Energia News on EnPoGen. Volume 5, Issue 3, November 2002.
Structuring Green Electricity Programs. Report on the presentation by Mark S. Kumm and A. Glenn Simpson of Pepco Energy Services, March 27, 2003. Enno Heijndermans and Susan Bogach.	

### Annex 9: Key ASTAE Funding Events

Year	Month	Agency	Event	Amount	Source
1992	January	WB	Creates ASTAE with 2 WB staff and 1 seconded USDOE renewable energy consultant	\$327,000 <sup>1</sup>	WB/USDOE
	March	ASTAE Donors Meeting #1 (WB/ASTAE funding proposal to donors)			
	May	ASTAE	Submits funding proposal (revised) to Netherlands Directorate-General for International Cooperation (DGIS) (\$4,798,500)		
	July	USAID	Approves ASTAE funding through USAID/WB Trust Fund	\$200,000	USAID
	July	UNDP	Submits funding proposal to Netherlands DGIS for ASTAE support (\$607,392)		
	September	USDOE	Funds to USDATA Trust Fund for ASTAE support	\$200,000	USDOE/USDATA
	November	WB	Creates Interim Fund for ASTAE while awaiting donor funding	\$500,000 <sup>2</sup>	WB
1993	March	ASTAE	Submits funding proposal for ASTAE to USDOE (\$3,500,000)		
	May	ASTAE Donors Meeting # 2			
	May	Neth. DGIS	Netherlands Trust Fund Arrangement signed	(\$4,401,180) <sup>3</sup>	Neth. DGIS
	June	Neth. DGIS	Netherlands Funding Tranche # 1	\$1,558,290	Neth. DGIS
	September	UNDP	Netherlands DGIS/UNDP Funding Agreement signed	(\$479,520) <sup>4</sup>	Neth./UNDP
	October	USDOE	Funds to USDATA Trust Fund for ASTAE support	\$250,000	USDOE/USDATA
	November	UNDP	UNDP Trust Fund Tranche # 1	\$29,250	Neth./UNDP
December	Neth. DGIS	Netherlands Trust Fund Tranche # 2	\$821,140	Neth. DGIS	
1994	April	ASTAE Donors Meeting # 3			
	May	UNDP	UNDP Trust Fund Tranche # 2	\$69,500	Neth./UNDP
	September	Neth. DGIS	Netherlands Trust Fund Tranche # 3	\$914,020	Neth. DGIS
	September	USDOE	USDOE Funding Agreement signed	(\$3,000,000) <sup>5</sup>	USDOE
	October	USDOE	USDOE Trust Fund Tranche # 1 (for ASTAE)	\$715,837	USDOE
	October	WB	PHRD Grant approved for use for India DSM	\$700,000	WB/PHRD
	November	Neth. DGIS	Netherlands Trust Fund Tranche # 4	\$583,220	Neth. DGIS
1995	April	WB	Approval IDF Grant for Philippines DSM capacity building	\$245,000	WB/IDF
	May	ASTAE Donors Meeting # 4			
	May	UNDP	UNDP Trust Fund Tranche # 3	\$35,000	Neth./UNDP
	September	WB	Approval Project Preparation Facility (PPF) Advance for Sri Lanka ESD project	\$340,000	WB/GEF
	September	UNDP	UNDP Trust Fund Tranche #4	\$377,100	Neth./UNDP
	October	WB	Approval GEF-Project Development Facility (PDF) Grant for Sri Lanka ESD project	\$200,000	WB/GEF
	October	WB	Approval GEF PDF Grant for China Renewable Energy Development Project	\$140,000	WG/GEF
October	USDOE	USDOE Trust Fund Tranche # 2 (for ASTAE)	\$339,000	USDOE	
1996	May	ASTAE Donors Meeting # 5			
	August	WB	PHRD Grant approved for use for India DSM	\$800,000	WB/PHRD
	October	USDOE	USDOE Trust Fund Tranche # 3 (for ASTAE)	\$180,000	USDOE
1997	January	UNDP	UNDP Trust Fund Tranche # 5	\$347,763	Neth./UNDP
	April	ASTAE Donors Meeting # 6			
	April	Neth. DGIS	Netherlands Trust Fund Tranche # 5	\$530,525	Neth. DGIS
	October	Neth. DGIS	Netherlands Trust Fund Tranche # 6a	\$215,000	Neth./UNDP
	October	UNDP	UNDP Trust Fund Tranche # 5b	\$287,728	Neth. DGIS
	December	Swiss Gov.	Swiss Trust Fund Agreement signed	(\$470,000)	Swiss Gov.

Year	Month	Agency	Event	Amount	Source
	December	Swiss Gov.	Swiss Trust Fund Tranche # 1	\$309,447	Swiss Gov.
1998	April		ASTAE Donors Meeting # 7		
	June	Netherlands	BNPP Agreement signed	(\$3,250,000)	BNPP
	August	Netherlands	Dutch Partnership Trust Fund	(\$2,250,000)	Neth. Partnership
	August	Netherlands	Dutch Partnership Trust Fund Tranche # 1	\$750,000	Neth. Partnership
1999	January	Swiss Gov.	Swiss Trust Fund Tranche # 2	\$154,723	Swiss Gov.
	March	Netherlands	BNPP Tranche # 1	\$2,250,000	Neth. Partnership
	March	ESMAP	ESMAP Agreement Signed	(\$223,000)	ESMAP
	April		ASTAE Donors Meeting # 8		
	April	ESMAP	ESMAP Transfer	\$223,000	ESMAP
	May	Netherlands	Dutch Partnership Trust Fund Tranche # 2	\$970,000	Neth. Partnership
	July	WB	PHRD Grant approved for use for Vietnam REAP	\$100,000	WB/PHRD
	August	Finland	Finnish Trust Fund Agreement signed	(\$569,000) <sup>6</sup>	Finland
	October	Finland	Finnish Trust Fund Tranche # 1	\$173,570	Finland
2000	January	Netherlands	Dutch Partnership Trust Fund Tranche # 3	\$530,000	Neth. Partnership
	April		ASTAE Donors Meeting # 9		
	May	U.K.	DFID Tranche # 1	\$633,368	U.K.
	May	Netherlands	BNPP Tranche # 2	\$1,000,000	B/NPP
	July	Finland	Finnish Trust Fund Tranche # 2	\$179,583	Finland
	October	UNDP	UNDP Trust Fund Tranche # 6	\$848,806	Neth./UNDP
	November	Finland	Finnish Trust Fund Tranche # 3	\$179,583	Finland
2001	April		ASTAE Donors Meeting # 10		
	April	Netherlands	Dutch Partnership Trust Fund	(\$1,250,000)	Neth. Partnership
	August	Netherlands	Dutch Partnership Trust Fund Tranche # 4	\$1,250,000	Neth. Partnership
	August	U.K.	DFID Tranche # 2	\$745,193	U.K.
2002	April		ASTAE Donors Meeting # 11		
	April	U.K.	DFID Tranche # 3	\$469,014	U.K.
2003	January	U.K.	DFID Tranche # 4	\$117,014	U.K.
	March	Canada	CIDA Climate Change Development Fund	(\$2,780,000) 7/	Canada
	April		ASTAE Donors Meeting # 12		
	April	Canada	CIDA Tranche # 1	\$1,675,141	Canada
	May	U.K.	DFIF Tranche # 5	\$378,578	U.K.

Note: Does not include annual World Bank support.

Footnotes:

- 1/ Includes \$227,000 committed by WB plus secondment of USDOE of Anil Cabraal and other consultants to ASTAE during FY92 (January–June 1992).
- 2/ Reimbursed to WB in June 1993, following receipt of Netherlands funding.
- 3/ To be disbursed in five tranches over three-year period. Retroactive to July 1992.
- 4/ To be disbursed in tranches over three-year period.
- 5/ To be disbursed in tranches of \$1,000,000 per year over three-year period, of which ASTAE receives \$700,000 per year. Retroactive to July 1994.
- 6/ To be disbursed in equal tranches over three-year period.
- 7/ To be disbursed in 4 tranches over three-year period.

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**Annex 10: ASTAE Staff**  
(July 1, 2002–June 30, 2003)

Mohammad Farhandi	Program Manager, ASTAE Acting Sector Director East Asia Energy and Mining Development Sector Unit
Noureddine Berrah	Deputy Program Manager
Anil Cabraal	Senior Renewable Energy Specialist/Renewable Team Leader
Susan Bogach	Senior Energy Economist
Enno Heijndermans	Alternative Energy Specialist
Chandrasekar Govindarajalu	Energy Specialist
Johannes Exel	Alternative Energy Engineer
Grayson Heffner	Senior Alternative Energy Specialist
Shelly Thorpe	Budget/Program Assistant
Teresita G. Velilla	Program Assistant
Cristina Hernandez	Team Assistant