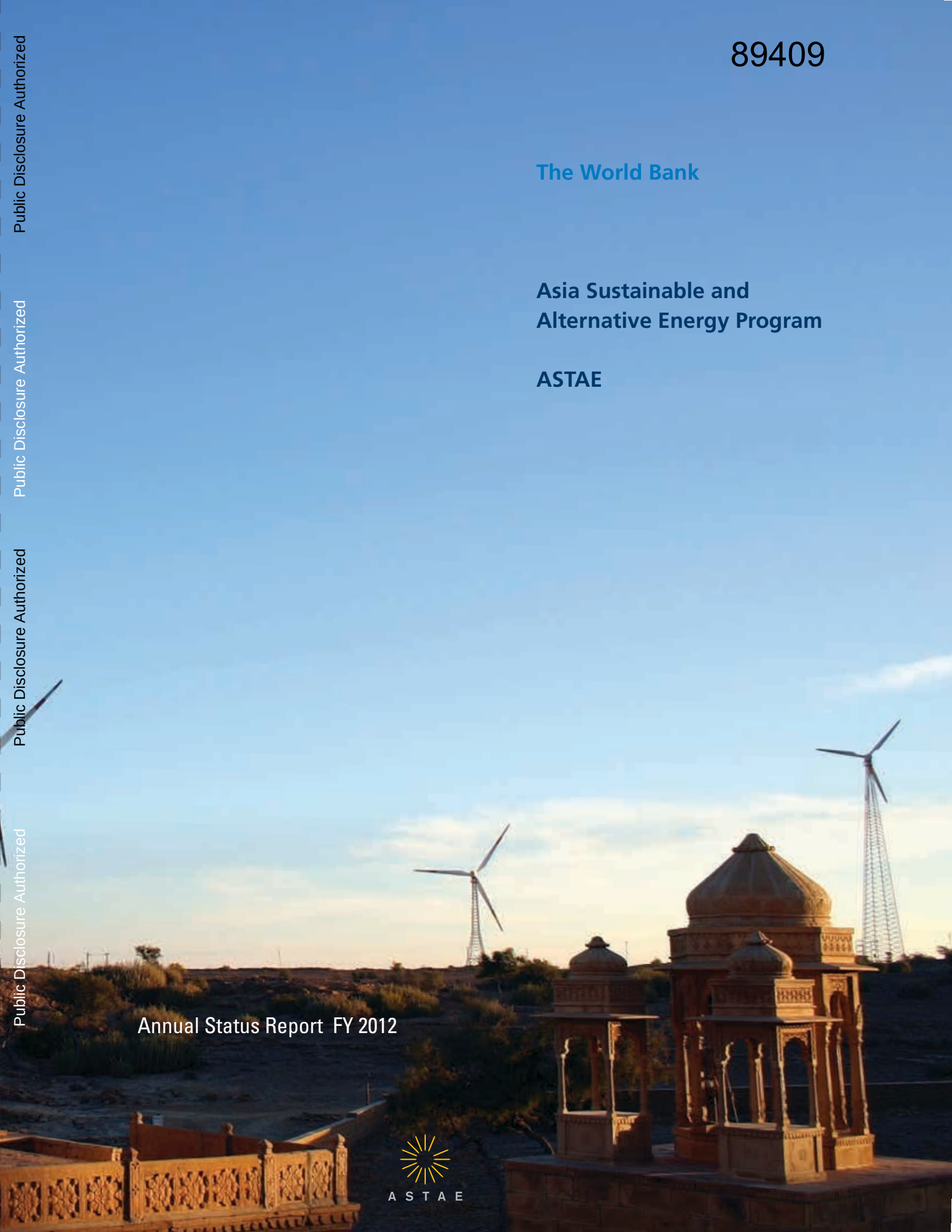
The World Bank

Asia Sustainable and Alternative Energy Program

ASTAE



Annual Status Report FY 2012

ASTAE

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Acronyms, Abbreviations, and Units of Measure

ASTAE	Asia Sustainable and Alternative Energy Program
BETF	Bank-executed trust fund
Board	World Bank Board of Executive Directors
CHEEF	China, Energy Efficiency Financing
CIA	Cumulative Impact Assessment
CO_2	Carbon dioxide
CTF	Clean Technology Fund
EAP	East Asia and Pacific Region
EASIN	World Bank East Asia Infrastructure Unit
EIA	Energy Information Administration (U.S. Department of Energy)
ESCO	Energy services company
ESMAP	Energy Sector Management Assistance Program
FY	Fiscal year
GDP	Gross domestic product
GEF	Global Environment Facility
GWh	Gigawatt-hour
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IEA	International Energy Agency
MDTF	Multidonor trust fund
MOIT	(Vietnam) Ministry of Industry and Transportation
MW	Megawatt
PDR	(Lao) People's Democratic Republic
PGE	Pertamina Geothermal Energy
PM	Particulate matter
REDP	(Vietnam) Renewable Energy Development Program
RETF	Recipient-executed trust fund
SAR	South Asia Region
SHS	Solar home system
Sida	Swedish International Development Agency
TAG	Technical Advisory Group

Foreword

This annual report for fiscal year 2012 (FY12) celebrates the beginning of a new ASTAE business plan for fiscal 2012–15. The new business plan period marks ASTAE's first multidonor trust fund and welcomes the increased participation of colleagues from the South Asia Region in ASTAE. I also wish to express my appreciation to the former ASTAE Program Manager, Vijay Jagannathan, who retired from the World Bank in July 2012, for his excellent contributions not only to ASTAE but also to the World Bank. I am excited to become the new ASTAE Program Manager and to make a positive contribution in this highly dynamic region in partnership with ASTAE donors, our client countries, and other partners.

The challenges ahead for ASTAE, based on experience and the characteristics of the region, are numerous. The East Asia and Pacific and South Asia regions comprise countries with widely varying levels of economic development, geographic size and remoteness, resource endowments, and cultures. The regions are vulnerable to climate change and other environmental impacts. With its strong operational focus on delivering results on the ground, I believe that ASTAE is well positioned to turn these challenges into opportunities for sustainable development and inclusive, low-carbon, green growth, devoting greater attention to regional and cross-sectoral cooperation, both physically and through the sharing of knowledge and experience. As the Millennium Development Goals (MDGs) target year of 2015 nears, I expect ASTAE to contribute, although indirectly, to providing the last boost to the MDGs, especially because the new ASTAE business plan spans fiscal 2012–15.

This first year of ASTAE-supported activities under the ASTAE business plan for fiscal 2012–15 started with a mix of large, medium, and small economies, all of which aspire to promote low-carbon, green growth, and address gender and other social and environmental issues whenever relevant. A recipient-executed activity was also introduced for the first time.

I very much look forward to working with the clients in the region, donors, and other partners to increase the value added of ASTAE and deliver meaningful and sustainable results.

Last, but not least, I wish to express my appreciation to the Netherlands and Sweden for their continuing generous support and to the United Kingdom for becoming a new ASTAE donor.

Charles Feinstein

ASTAE Program Manager

Sector Manager, Water and Energy Unit (EASWE)

Sustainable Development Department

East Asia and Pacific Region

The World Bank

ASTAE AT A GLANCE

Created in 1992, the Asia Sustainable and Alternative Energy Program (ASTAE) has been instrumental in moving the World Bank East Asia and Pacific Region portfolio toward sustainable energy. Embedded in a regional unit to maximize its leverage and operational impact, the program now covers East and South Asia client countries.

ASTAE works in close cooperation with the Energy Sector Management Assistance Program (ESMAP) and other World Bank Trust Funds.

The ASTAE program rests on three pillars:

- Renewable energy
- Energy efficiency
- Access to energy

ASTAE's progress is measured by SIX impact indicators:

1. Total World Bank lending catalyzed by ASTAE activities
2. New capacity (in megawatts) and generation (in gigawatt-hours) of renewable energy
3. Electricity savings resulting from efficiency improvements
4. Households with access to modern energy services
5. Avoided greenhouse gas emissions
6. Countries benefiting from ASTAE support

ASTAE funds Bank-executed activities and has now funded one recipient-executed activity, with more envisioned.

Donor countries in fiscal year 2012 (FY12) are the Netherlands and Sweden, with the United Kingdom joining in early FY13. Past donors comprise Australia, Canada, Finland, Japan, Switzerland, and the United States.

Current donors have indicated a particular interest in having the following supplementary dimensions incorporated into ASTAE activities, as feasible:

- Climate Change Mitigation and Adaptation
- Social Focus - Gender, Human Rights, Poverty
- Regional Integration and Cooperation
- Cross-Sectoral Collaboration
- Energy-Water-Food-Security Nexus

Executive SUMMARY

ASTAE-Supported Activities in FY12

Fiscal year 2012 (FY12) was a restart year for ASTAE. Having closed its previous business plan in FY11 and disbursed all funds available under its existing single-donor trust funds, it set up a new multidonor trust fund (MDTF) that became effective in summer 2011 and was funded during the first half of FY12. ASTAE started calling for proposals and allocating funds to activities in fall 2011.

Overview of ASTAE

ASTAE was created in 1992 as a global partnership program. Its mandate—then and now—is to scale up the use of sustainable energy options in Asia to reduce energy poverty and protect the environment. Achievement of this objective is built on promoting ASTAE's three pillars for sustainable development: renewable energy, energy efficiency, and access to energy.

The program has been instrumental in increasing the share of sustainable energy projects in the World Bank energy portfolio in Asia; it has been especially successful in the East Asia and Pacific region (EAP). Today, ASTAE operates in client countries in both EAP and the South Asia region (SAR), with each region defined in appendix 1. ASTAE is focused on downstream and operations-oriented activities that directly support and enhance World Bank lending projects related to the three ASTAE pillars.

ASTAE's objectives, history, delivery mechanism, indicators, and targets are described in chapter 1.

Overview of Allocations in FY12

In FY12, ASTAE allocated US$4,459,000 to new activities and disbursed US$741,930. ASTAE allocated funding to 16 activities in 9 countries and to 4 regional-level activities. The relatively low level of disbursements is explained by the usual lag between allocation of funds and disbursements that are conditional on advancement and completion of the activity's tasks. The pace of disbursements is expected to pick up in the coming years.

ASTAE allocated US$4,459,000 toward activities in FY12, or 91 percent of its total budget this year; the remaining 9 percent of the budget covered administrative and reporting costs. Allocations reflected the proposed balance of activities suggested among all three pillars for the business plan period, with a stronger emphasis on renewable energy (54 percent) and a strong showing on access to energy (32 percent), and energy efficiency accounting for the remaining 14 percent.

In FY12, two-thirds of the funding was allocated to EAP with the remaining third to SAR. Indonesia benefited the most, receiving 30 percent of the allocated ASTAE funding, followed by Vietnam at 10 percent. Small islands remain well represented, with Tonga and Maldives combining for 16 percent of funding. In addition, in conformity with donor requests, no allocations were made to China or India in FY12.

With four activities, regional work represented more than a quarter of the amount allocated, continuing its growth trend initiated in the 2007–11 business plan period. Support to International Development Association countries accounted for 27 percent of allocations.

Details related to allocations in FY12 are provided in chapter 2.

Program Progress toward the Fiscal 2012–15 Business Plan Targets

A detailed analysis of the outputs and impacts for the 2012–15 business plan period is provided in chapter 3.

ASTAE tracks a set of indicators that illustrate its impact in supporting sustainable energy development. The indicators were chosen to convey the predominant trend within each pillar. For each new World Bank project that receives ASTAE support and is presented to the Board of Executive Directors, the impact indicators are accumulated throughout the business plan period to produce the aggregated indicators summarized below.

The progress presented in this annual report is very partial, covering only the first year of a four-year business plan. Its unequal distribution among indicators, with some already exceeded and others not yet started, cannot be construed as a trend.

Indicator 1: Total World Bank lending catalyzed by ASTAE activities

FY12 was a very active year, with five ASTAE- supported Bank projects approved by the Board for a total of US$1,301 million. All projects but one were carried over from the 2007–11 business plan period, meaning that ASTAE activities took place under the previous business plan but the related Bank projects were approved in FY12.

The following FIVE ASTAE-supported projects were approved:

- July 2011: Vietnam, Clean Production and Energy Efficiency Project
- July 2011: Indonesia, Geothermal Clean Energy Investment Project
- September 2011: China, Energy Efficiency Financing III Project
- April 2012: Mongolia, Ulaanbaatar Clean Air Project
- April 2012: Pakistan, Natural Gas Efficiency Project

FY12 also marked the return of ASTAE leverage on SAR projects after a long period without much activity in the region. This influence on South Asia lending is expected to increase as more and more ASTAE activities in the region receive funding.

Indicator 2: Renewable energy - New capacity and increased generation of renewable electricity

By supporting projects that directly facilitate investment, ASTAE activities led to increased capacity and generation from renewable sources. In FY12, the Geothermal Clean Energy Investment Project in Indonesia was approved and is expected to result in the direct installation of 150 MW of renewable energy to generate 1,208 GWh every year. This project will achieve 40 percent of the ASTAE business plan period target for generation from renewable energy.

Indicator 3: Energy efficiency – Equivalent capacity and electricity savings resulting from efficiency improvements

Annual savings estimates are calculated based on direct savings through World Bank loans. With three projects approved related to energy efficiency, strong progress under this indicator was made. Avoided capacity equivalent to 350 MW and direct savings of 2,820 GWh annually (35 and 141 percent, respectively, of targets) are expected from the Pakistan Natural Gas Efficiency Project.

Indicator 4: Access to energy - Households with access to modern energy services

This indicator shows the lowest level of progress yet for the business plan period. Some small-scale progress was made with space heating in Mongolia with 175,000 households likely to benefit, but at a mere 3 percent of target. No progress has been made on electricity access.

Indicator 5: Avoided greenhouse gas emissions

This indicator estimates the quantity of carbon dioxide (CO_2) emissions that would be avoided over 20 years (the conventional lifespan of projects or equipment) through ASTAE-supported World Bank projects. The CO_2 targets have already been met in this first year of the business plan period, simply through support of the Pakistan Natural Gas Efficiency Project. This abnormal impact is due to the very high greenhouse gas coefficient of methane. The achieved value is estimated to be 277 million tons of CO_2, or 138 percent of the target for the business plan period.

Indicator 6: Countries benefiting from ASTAE support

This indicator ensures that ASTAE resources are used in a balanced manner across all ASTAE countries, providing equal funding opportunities to large countries (Pakistan, Indonesia, and Vietnam) and to smaller countries (Pacific Islands, Maldives). ASTAE financed activities in 9 countries out of the 15 targeted for the business plan period, in addition to its regional activities.

ASTAE's Business Plan For Fiscal 2012–15

ASTAE continues to evolve to accommodate the changing needs in EAP and SAR, but the basics of ASTAE's mandate and its pillars will stay the same. Building on lessons learned, ASTAE has forged a new business plan for fiscal 2012–15. The business plan was drafted with a funding target of US$20 million. The business plan is further detailed in chapter 4.

ASTAE seeks to continue its successful work in EAP and extend it in SAR. Consistent with its downstream project- and program-oriented focus, it added recipient-executed trust fund activities to the current Bank-executed trust fund activities. Intervention at the national level will remain the core intent, but specific attention will be paid to opportunities to scale country practices up to regional applicability. At the same time, given the growth and importance of cities and urbanization, ASTAE will also seek to provide support at the subnational level. It will continue to seek cross-sectoral synergies whenever relevant to the ASTAE pillars.

Specific Objectives of the Third Phase of ASTAE

ASTAE's specific objective in its early days was to mainstream alternative energy into the World Bank's lending and grants in EAP. In ASTAE's second phase, the objective was to scale up its activities, mainly within individual countries. In this third phase, the specific objective is to promote low-carbon, green growth, and to increase the supply of and access to sustainable energy on a regional basis. ASTAE will devote special attention to the promotion of sustainable energy as part of a region-wide system to create collaborative impacts and encourage increased efficiency. The growing importance of the regional dimension of ASTAE's mission is visible in the demand for ASTAE's long-standing experience and capability.

Low-carbon, green growth

Promoting low-carbon, green growth calls for cross-sectoral work. Priority activities include ecologically and economically sustainable cities (which will require the integration of land-use planning, transport, buildings, infrastructure services, and urban agriculture) along with rural development, for which renewable energy, food security, and water management, among others, must be coordinated.

Scaling up supply of and access to sustainable energy on a regional basis

Intra- and interregional activities will address specific issues that are best handled at the supranational level. In addition to supporting regional projects as defined under International Development Association guidelines, ASTAE will encourage South-South cooperation and knowledge sharing, and will continue to support the regional, cross-border, and common (or similar) challenges faced by countries in the region.

1

Overview OF THE ASTAE PROGRAM

In 2010, developing countries in Asia were home to more than 3.4 billion people, close to half the world's population, and generated close to US$10 trillion in GDP, about 15 percent of the global total.[1] Although this population-wealth imbalance remains, the exceptional economic growth Asia recorded during the two past decades lifted millions of people out of poverty and confirmed the continent as one of the world's major economic engines, alongside Europe and North America.

As a consequence of this growth, fossil fuel consumption in many countries in the region has accelerated, leading to substantial growth in the carbon dioxide (CO_2) emissions that make up the largest share of greenhouse gases. Yet, hundreds of millions of people in the region still lack access to modern energy services and cannot enjoy the related health, social, and economic benefits that could improve their quality of life.

Why ASTAE?

According to the U.S. Department of Energy's Energy Information Administration, which tracks world energy statistics, CO_2 emissions in Asian developing countries from consumption of energy increased 125 percent between 2000 and 2009—about four and a half times faster than the world average. Although other sources of greenhouse gas emissions contribute to the total, it is commonly acknowledged that the use of fossil fuel–based energy remains by far the largest source of emissions. With 170 percent growth in emissions during this period, in 2007 China became the world's largest source of CO_2 emissions, and is now well ahead of the United States. In 2009, it emitted 7.7 billion tons—25 percent of the world's total. Today, although absolute greenhouse gas emissions in Bangladesh, India, Indonesia, Pakistan, Thailand, and Vietnam are still low, their emissions growth rates are much higher than the world average.

The growing consumption of energy is not evenly distributed among households across the world. Access to and consumption of modern energies remain very concentrated, both among and within countries. The access challenge might seem greatest in Africa, but the sheer size of Asia's population means that it cannot be ignored. The United Nations estimates that more than half of the 1.4 billion people still without access to electricity live in developing Asia, 400 million of them in India. Similarly, more than 70 percent of the 2.3 billion people that still rely on biomass for cooking live in developing Asia. The lack of access to modern energies hinders human and economic development opportunities, puts often unsustainable pressure on local natural resources, and contributes to local and global pollution. The human cost is real: the World Health Organization estimates that 600,000 premature deaths annually are related to cooking using biomass in East Asia alone. The gender dimension of that sobering fact should also be noted given that cooking-related indoor air pollution disproportionately affects women and children.

These access and consumption issues have led the world community to engage in expanding the use of renewable energies while promoting more efficient use of energy in general, and to call for universal access to modern energies. These issues constitute the three pillars upon which ASTAE builds its development work.

Brief History, Challenges, Beneficiaries, and Donors

ASTAE was established in 1992 by international donors as a three-year pilot program with the objective of "mainstreaming" alternative energy in the World Bank's lending and technical assistance operations in the South Asia (SAR) and the East Asia and Pacific (EAP) regions.

ASTAE grew out of the Financing Energy Services for Small Scale Energy Users Project (FINESSE), initiated in 1989 by the Energy Sector Management Assistance

[1] Detailed economic and energy indicators for each country in which ASTAE is active are provided in Appendix 1.

Program (ESMAP) and bilateral donors, including the U.S. Department of Energy, the Netherlands Directorate-General for International Cooperation, and the United Nations Development Programme. Following a joint request from Asian borrowers and donor partners, the Bank acted to implement the FINESSE recommendations by creating the Asia Alternative Energy Unit (ASTAE), as part of the Asia Technical Department, in January 1992.

ASTAE's original target was to increase the share of alternative energy in Bank lending to the power sector in Asia to 10 percent. This goal was achieved during the fiscal 1997–2000 business plan period. ASTAE's life was extended by mutual agreement among the Bank and donor countries. It was restructured as a program in 1998, and was merged with the East Asia Energy and Mining Development Sector Unit, while continuing to provide support to South Asia.

Leverage of Bank Operations

ASTAE's original task of promoting the use of alternative energy encompassed energy efficiency and renewable energy—ASTAE's two original pillars. To ensure a strong operational focus, ASTAE was embedded directly into regional operations.

ASTAE began its work by providing supplemental funding to forward-looking World Bank Task Team Leaders eager to undertake small peripheral endeavors to address alternative energy–related issues encountered during the development of their projects. This often occurred through the addition of an alternative energy–specific component to a broader energy project. As these ASTAE-funded activities increased in number and positively affected regional development objectives, renewable-energy and energy-efficiency activities eventually became stand-alone projects instead of components of projects. These stand-alone projects were often supported by Global Environment Facility (GEF) financing. ASTAE's operational success led its donors to replenish the trust fund at the end of each business plan period. Alternative energy, a fringe activity when ASTAE was created, has evolved into one of the Bank's main lending themes, exceeding 40 percent of energy commitments in fiscal year 2009 (FY09) and thereafter.

Scale-Up and Expansion

In 2002, ASTAE started a scale-up phase. In addition to continuing its mission of mainstreaming alternative energy, ASTAE expanded its reach from within the World Bank to the client countries' stakeholders themselves, and broadened its core business from alternative energy to sustainable energy by adding a third pillar—access to modern energy services—designed to address energy poverty and its impact on the environment. Scaling up also meant departing from project-to-project activities to take a more programmatic approach at the sector and country scale. During this transition, ASTAE focused primarily on EAP.

As ASTAE's funding and scope expanded, measuring its reach and impact became more challenging, and a broad set of indicators was designed to assess progress toward fulfilling its three pillars. These sustainable energy indicators—access to modern energy services, increased use of renewable energy, and improved energy efficiency (described later in this chapter)—track progress made through ASTAE activities, both as a direct result of related World Bank loans and as an indirect result of ASTAE-funded technical assistance to country stakeholders.

FY12 and Beyond, a New Structure and Increased Funding

In 2011, ASTAE started its new four-year business plan that reaffirms the emphasis on mainstreaming sustainable energy in the Bank's portfolio in Asia, and consolidates the focus on its three pillars of activities. This new business plan increases funding to better cover both subregions of Asia, and to grow the regional dimension as well as to begin recipient-executed activities. The 2012–15 business plan is further detailed in chapter 4.

ASTAE's Objectives and Delivery Mechanisms

ASTAE's objective is to scale up the use of sustainable energy options in Asia to protect the environment and

reduce energy poverty. Three pillars further define and support this objective.

Three Pillars to Support Sustainable Development

ASTAE efforts to champion sustainable development in the Asian energy sector are built on three pillars

First Pillar: Renewable Energy

Supporting energy generation growth by means of renewable-energy technologies slows the depletion of natural resources, limits global environmental damage, and can contribute to the substitution of domestic resources for imported ones. Renewable energy resources include hydroelectric, biomass, wind, geothermal, and solar energy. Several countries in the region have set ambitious targets for renewable-energy generation, but much remains to be done to reach these targets.

Second Pillar: Energy Efficiency

Given that most energy today is generated from finite fossil fuels, using less energy to reach the same desired outcome is an effective way to contribute to sustainable development. Energy intensity per unit of GDP is high in most Asian countries, indicating that room for efficiency improvement is present in all sectors of the economy. Energy-efficiency improvements can be achieved through electricity generation, energy demand management, central heating, or individual stove use. Efficiency in the energy sector is the primary target of this pillar, but ASTAE also reaches across sectors to promote this agenda, having worked in the water, buildings, and transport sectors.

Third Pillar: Access to Modern Energy Services

Access encompasses new access (for example, connecting a previously un-electrified household) and improved access (for example, construction of a biogas stove to replace charcoal for cooking). Access to modern energy can significantly improve the quality of life for end users, providing benefits such as light, heat, and power for electrical appliances and tools in a much more efficient and less polluting fashion than the displaced resources, often at a fraction of the cost. In the past decade some countries, such as China, Vietnam, Lao PDR, and Pakistan, have made dramatic progress in providing electricity access to their citizens, but others lag far behind. Additionally, most countries in the region have inadequately tackled the negative impacts of traditional domestic heating fuels, whether for cooking or space heating, and have been slow to devise strategies to transition households to modern fuels or to improve the efficiency and cleanliness of traditional fuels.

To track the contributions and achievements of ASTAE-funded activities relative to each pillar, pillar-specific indicators have been defined (detailed later in this chapter). These indicators help monitor annual progress toward specific targets defined for each business plan period. Over time, ASTAE has expanded its monitoring beyond input-based indicators (linking ASTAE funding to World Bank lending) to include output-based indicators (final impacts delivered through ASTAE's lending, measured in megawatts, gigawatt-hours, or number of connections).

Mode of Operation: Approaches, Support Mechanisms, and Structure

Close Collaboration with Donors

The key to ASTAE's success is its dual partnership model—partnering with World Bank task teams to undertake the operational aspects of its activities and partnering with its donors to determine and fund its strategic goals. The resulting synergy allows all parties to explore and seize opportunities to realize ASTAE's mission. Donor countries, including the Netherlands, Sweden, Canada, Finland, Switzerland, the United Kingdom, and the United States, have over the years endowed ASTAE with block grant funding that advances the agreed-upon themes and targets. In turn, ASTAE provides Task Team Leaders with resources that are then used to support important activities in a timely and flexible way, and ultimately help demonstrate the validity and feasibility of integrating sustainable energy into the Bank's project portfolio. Because ASTAE management is located in the regional operational unit, decisions about which proposed activities

to be funded fully reflect the country or regional assistance strategy and the priorities of the country or regional assistance program, while at the same time aligning with donors' overarching priorities.

The ASTAE Trust Fund covers only a small portion of the costs of project preparation or technical assistance to client countries. However, the strategic use of these funds enables a far greater impact than otherwise would be possible through its influence on which projects enter the World Bank pipeline and on the dissemination of operational experience. ASTAE also cooperates with other World Bank donor trust funds to ensure optimal use of donor funding.

Organized to Deliver

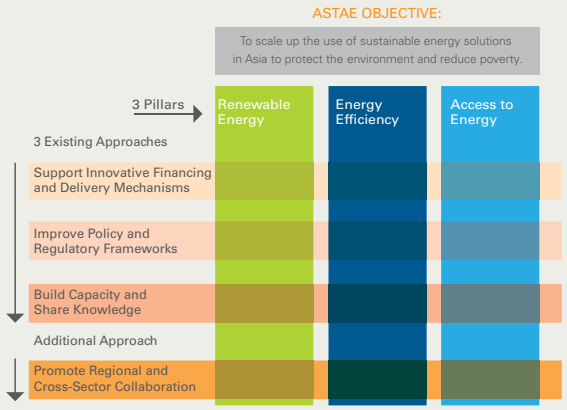
ASTAE's overall strategy is to focus on supporting program development and project implementation in World Bank operations, that is, "downstream" activities. The emphasis on downstream activities reinforces the effectiveness of ASTAE's three pillars of sustainable development and provides the most efficient way to achieve substantive results.

Four approaches—innovative investment delivery mechanisms, improved policy and regulatory frameworks, effective knowledge sharing, and the newly added support to cross-sector and regional collaboration—characterize ASTAE's implementation of its overall strategy. ASTAE provides a wide range of support mechanisms, such as early program and project identification work, quick response and troubleshooting, project-related capacity building, and funds mobilization. These support mechanisms are provided by ASTAE staff and World Bank Task Team Leaders. Their constant interaction forms the backbone of ASTAE's operational structure. Other important elements of the structure include the Consultative Group on World Bank Energy Trust Funds, representing donor countries, and a Technical Advisory Group that evaluates ASTAE activities annually and reports to the donor community represented by the Consultative Group.

ASTAE Approaches

Financing for sustainable energy is available through many avenues, although the complexities of fund allocation and recipient designation for each financing option make finding the right channel a challenge. ASTAE seeks to provide practical and operational solutions to obstacles created by lack of awareness, institutional blockages, or inadequate delivery mechanisms.

Figure 1-1: Interlinking Objective, Pillars, and Approaches



The connections among the ASTAE objective, the three pillars, and the four approaches are shown in figure 1-1. The approaches described below are derived from previous business plans with the addition of one new approach.

Support Innovative Financing and Delivery Mechanisms

ASTAE helps introduce innovative financing and delivery mechanisms. Financing was a major part of ASTAE's work during its initial years because mechanisms designed for conventional energy investments did not fit the needs of ASTAE's intervention areas and had to be adapted. As sustainable energy projects became more mainstream, related markets matured and projects became more complex and sophisticated. This approach is carried out either by supporting the design, buildup, and testing of new financing mechanisms from the start, or by introducing existing mechanisms and tailoring them to the specific context of a new host country.

Recent examples of improved financing delivery mechanisms include developing investment prospectuses for private sector investment (assisting the green-diesel-based grid in Indonesia), structuring on-lending of funds (renewable energy in Vietnam), and transferring business models between neighboring countries (energy efficiency from China to Vietnam). Delivery mechanisms can also apply to organizational, technical, and business models that can facilitate the development or scale-up of an activity (pro-poor, design-driven innovation in clean energy in Indonesia).

Improve Policy and Regulatory Frameworks

ASTAE supports the development of institutional and regulatory frameworks. Allocations to this approach have grown steadily since initiation of the scale-up phase, because framework development benefits programmatic schemes that have the potential for wider applicability. Institutional and regulatory framework development primarily supports projects with impacts that are replicable, scalable, and sustainable. ASTAE provides an enabling environment through improved policy, financial, and regulatory frameworks, which help attract capital from international financial institutions, export credit agencies, and the private sector.

Recent work includes high-level policy dialogue and advisory support (clean stove initiative in Indonesia and Lao PDR), pricing policy and regulation (support to regulator in Maldives), and design and implementation of standards (code for third-party access in Papua New Guinea).

Build Capacity and Share Knowledge

ASTAE supports capacity building and knowledge sharing. These activities are at the core of ASTAE's mission, underpinning the success and effectiveness of the previous two approaches. As a result of its positive outcomes in project and program design, implementation, and replication, ASTAE is able to draw upon a pool of expertise and consolidate its knowledge base to provide just-in-time advice to other groups engaging in the same activities across the region. The knowledge-sharing approach can operate as a stand-alone activity or as an integral part of a project if the need for capacity building or knowledge sharing goes beyond normal project-related expectations.

Recent knowledge-sharing work includes training seminars for officials and policy makers (Bangladesh, Indonesia, Mongolia, and Thailand); knowledge products (fundamentals of energy road map for small islands), technical guides (greenhouse gas mitigation in road construction), methodologies (satellite imagery for monitoring of rural electrification), and atlases made available nationally and internationally; dialogue facilitation with the nongovernmental organization community; and donor coordination.

Promote Cross-Sector and Regional Collaboration

Intra- and interregional activities will continue to address specific issues that are best handled at the supranational level. In addition to supporting regional projects as defined under International Development Association (IDA) guidelines, (which, among other conditions, require involving three or more countries and require that the benefits, either economic or social, spill over country boundaries), ASTAE will encourage South-South cooperation and knowledge sharing, and continue to support the regional, cross-border, and common (or similar) responses to challenges faced by countries in the region. Cross-sector work is also a key dimension promoted by ASTAE, in part through its commitment to supporting low-carbon, green growth that requires thinking beyond traditional sector boundaries. Activities leading to ecologically and economically sustainable cities (for example, integrated land-use planning, transport, building, other infrastructure services, and urban agriculture) as well as rural development are supported. This also includes creating synergy between renewable energy, food security, and water management.

Recent examples of regional work include the development of a strategy in the household sector for the South Asia unit, and cross-regional cooperation on developing a means for using satellite imagery to monitor the advancement of rural electrification. Recent examples of cross-sector work include capacity building in energy through the education sector in Indonesia and greenhouse gas mitigation in road construction in Vietnam.

ASTAE Support Mechanisms

ASTAE provides depth of knowledge and flexible, just-in-time funding to shape the design of new projects and programs for success, to help implement them, or to adapt them to rapidly evolving conditions. ASTAE's presence in most Asian countries has helped enable cross-fertilization among different operations, thus developing a strategic, programmatic approach to broadening the impacts of investment projects. This cross-cutting position, in turn, has helped create enabling environments in which ASTAE shares best practices to improve institutional, policy, financial, and regulatory frameworks in recipient countries. The seven support mechanisms described below are often provided in conjunction with other partners, trust funds, and donors, so the activity benefits from the comparative advantage of each player.

1. Early Program and Project Identification Work

Best practices and new business models for alternative energy and access deployment are still being established; ASTAE helps support the development of this global knowledge base. Renewable energy is now a feasible technology model, but best practices for alternative energy deployment are still in the early stages. Large populations in Asia remain without access to electricity, indicating that current business models for access delivery need adjustment or improvement. Households' needs, what they can afford, and their readiness to adapt to innovative technologies may be unknown. ASTAE support to Task Team Leaders and stakeholders is critical to assessing and overcoming these barriers.

2. Program and Project Development and Implementation Work

For especially complex or innovative projects and programs, ASTAE can provide planned or unplanned support during identification and implementation. ASTAE support is provided only when circumstances require budget or expertise above and beyond normal project funding.

3. Quick Response and Troubleshooting

ASTAE provides just-in-time response to support the urgent needs of Task Team Leaders during project development (for example, responding to stakeholders' specific issues or identifying market segments) and supervision (for example, troubleshooting unexpected regulatory barriers). ASTAE's flexibility in taking on such issues on short notice has proved indispensable in devising and delivering solutions that prevent projects from being halted.

4. Project-Related Capacity Building

When capacity-building needs go beyond the reasonable expectations of normal project preparation or implementation (for example, to strengthen the capacity of new counterparts resulting from unexpected political changes), ASTAE can assist with training programs, workshops, consensus-building conferences, twinning, study tours, and access to subject matter advisers.

5. Funds Mobilization

ASTAE assists Task Team Leaders in mobilizing additional funds by helping to clarify funding requirements for a given sustainable energy project. Careful use of a relatively small amount of ASTAE support can persuade new partners to join, leveraging initial financing to magnify its impacts.

6. Global Knowledge Interface

Early barriers to projects that include sustainable energy components are often lack of awareness of an alternative option or technology and lack of understanding of how the option can be implemented. Providing support to Task Team Leaders or stakeholders to raise awareness is the first step in addressing this barrier. Such support is provided upstream or midstream during the project cycle—when existing expertise is made available through ASTAE's network of subject matter consultants—and downstream when the new information generated by the project or the ASTAE activity is analyzed, monitored, and packaged for dissemination. ASTAE's monitoring and evaluation of project or program impacts is becoming an increasingly important task.

7. Impact Monitoring and Evaluation

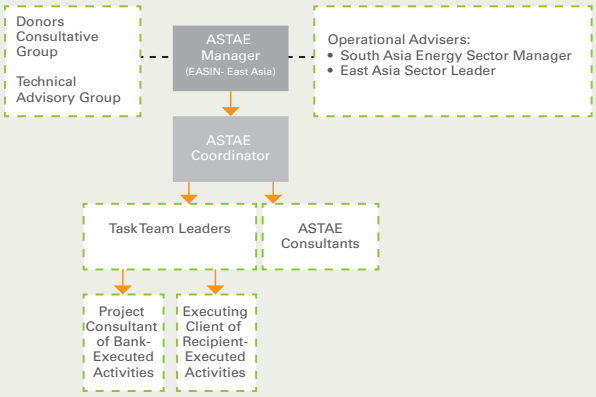
ASTAE's monitoring and evaluation of project and program impacts are increasingly necessary to ensure that new information generated by projects or ASTAE activities is analyzed and packaged to be imparted to others. Its long experience in supporting sustainable energy projects has

positioned ASTAE to commission studies and analyses of its past projects to capture and share lessons learned that may be of great value to other countries.

ASTAE Structure

The ASTAE management structure, shown in figure 1-2, includes both functional and hierarchical interactions.

Figure 1-2: Management Structure



Hierarchical Structure

Because ASTAE is embedded within the World Bank East Asia and Pacific Water and Energy Unit (EASWE), the Infrastructure Sector Manager also serves as the ASTAE Program Manager and coordinates with the South Asia Energy Manager when needed. The ASTAE Coordinator is a World Bank staff member who provides day-to-day operational and administrative supervision of the ASTAE program, and supports Task Team Leaders, acts as a liaison with donors, and coordinates with local counterparts.

ASTAE also employs local staff in the Bank's partner-country offices to gain better insight into country-specific challenges and to support project implementation. A part-time budget administrator supports the ASTAE Coordinator in monitoring financial information.

Functional Structure

The efforts of three types of contributor (dotted boxes in figure 1-2) complement ASTAE's work within its structure:

- *Donors* set the agenda for the specific funding lines made available to ASTAE, and as members of the Donors Consultative Group, help the ASTAE Program Manager guide the program. They receive support from the Technical Advisory Group, which includes specialists with expertise in each ASTAE pillar. Depending on specific trust funds' agreements, donors may provide non-objection to ASTAE activities that require allocations above a predefined ceiling.
- *Task Team Leaders* are World Bank staff who identify needs for ASTAE funds to support sustainable energy in their spheres of activity and submit requests for funding. Each proposal is evaluated on its expected contribution to ASTAE objectives, the availability of alternate funding, and the novelty or complexity of the project. Once an activity is approved, the Task Team Leader is responsible for its timely, cost-effective, and high-quality delivery. ASTAE funds are used to cover the incremental costs of developing pillar-related activities that go beyond the standard preparation and supervision costs covered by World Bank budgets.
- *Consultants* are hired by Task Team Leaders, using ASTAE-allocated funds, to carry out the necessary tasks for implementation of the ASTAE activity. Consultants may be activity based—that is, hired for a given duration to undertake activity-specific assignments for project-related tasks—or program based. Program-based consultants often provide more direct support to Task Team Leaders for project preparation and implementation, as well as support for the management of ASTAE-related activities. Consultants can be individuals or firms. Standard Bank procurement rules are applied to all ASTAE-funded activities.

Performance and Targets

ASTAE provides funding allocations to Task Team Leaders who have substantiated the nature of the incremental activities they will undertake, the related costs, and the expected impacts. The activities are then carried out, yielding outputs that, whenever possible, are recorded and formatted for knowledge sharing. In addition to tracking these outputs, the progress toward ASTAE program

objectives is measured against a set of indicators and targets developed to reflect the objectives outlined under the three ASTAE pillars. The collective contribution of all activities to reaching ASTAE targets is measured annually.

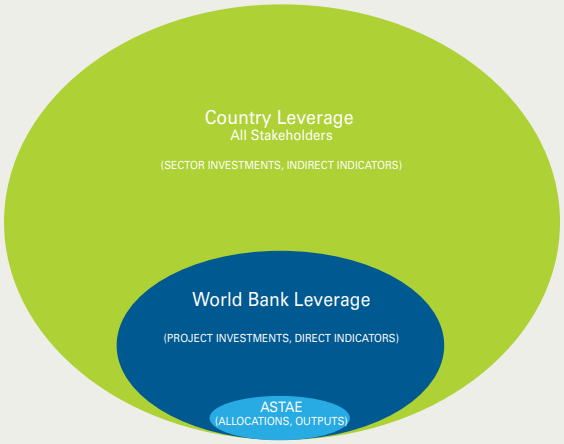
Tools for Leverage

Budget, allocations, and outputs are the elements over which ASTAE has direct control and with which it measures its administrative effectiveness. The smallest ring of influence and impact in figure 1-3 represents this sphere.

Leverage indicators and their related targets are beyond ASTAE's direct control, but within its capacity to influence. In ASTAE's early years, leverage of World Bank operations was the chief indicator monitored. It was measured by tracking the dollar amounts of World Bank loans allocated to ASTAE pillars. Measuring ASTAE's leverage of Bank operations today consists of quantifying actual impacts in addition to lending amounts. The impact on Bank lending is considered direct, because the support to Task Team Leaders in project design and implementation directly results in improved operations and, therefore, impacts. These direct impacts are represented by the middle ring in figure 1-3.

Broader leverage, at the sector level in a country, is far more difficult to measure; direct attribution to one activity or player should be made cautiously. However, once a decision to acknowledge ASTAE's contribution is made, some formal assessment of related impacts in the field is necessary to gauge whether funds have been used efficiently. The impacts and indicators used to inform this assessment are derived from activities and programs that support enabling legislation, decrees, or behavior modification of key stakeholders that could result in large-scale effects on the three ASTAE pillars. This leverage is represented by the larger ring of influence and impact in figure 1-3.

Figure 1-3: ASTAE Influence and Impacts at Different Levels



Budget, Allocations, and Outputs

ASTAE's budget is agreed upon with donors on a now four-year basis covering a business plan period. In FY11 ASTAE closed its 2007–11 business plan period and in FY12 started its new business plan, which is discussed in chapter 3. During its business planning phase, ASTAE comes to an agreement with its donors on the budget necessary to undertake its defined mission and on a set of indicators to measure its success in leveraging its funding to influence stakeholders' commitments to the ASTAE pillars. The initial budget estimated for the fiscal 2012–15 business plan was US$20 million, a significant increase from its fiscal 2007–11 budget of US$9.9 million.

ASTAE allocations are provided to Task Team Leaders based on the merits of their proposals to undertake activities supporting ASTAE's pillars. Activity duration varies according to the nature and complexity of the tasks involved, but most are completed in one or two years. In the 2007–11 business plan period, ASTAE allocated an average of US$120,000 to each of 68 activities, with most allocations ranging between US$100,000 and US$250,000. Although the fiscal 2012–15 business plan is still in its early stages, the allocations in FY12 have increased significantly, to an average of US$300,000 per activity.

ASTAE activities deliver outputs in a variety of formats, depending on the audience targeted. Outputs vary from stakeholder-specific notes (confidential policy notes, country strategies, or draft standards and labels,

for instance), to broad public case making (population awareness and project information). Outputs are discussed at stakeholder meetings, workshops, and conferences, and whenever suitable, are also published, printed, and widely distributed to a broad audience, including through ASTAE's website.

Indicators and Targets

Six indicators track the impacts of ASTAE-supported activities on advancing the development of sustainable energy. Three indicators are related specifically to the renewable energy, energy efficiency, and access to modern energy services pillars; three indicators cross all pillars.

ASTAE pledges to achieve specific targets for these indicators by the end of each business plan period. Target achievement is measured both as a direct result of related World Bank loans, and as indirect impacts of World Bank and ASTAE technical assistance to stakeholders in client countries.

Most activities contribute to the indicators' targets. Estimated values for direct indicators are derived directly from World Bank project information documents, project appraisal documents, and formal ASTAE proposals. Because final figures can only be known years after the end of a project, initial values are estimates. Indirect impacts are also collected whenever possible, but because they are difficult to attribute, ASTAE does not pledge or target numbers for indirect impacts.

Indicator 1: Total World Bank lending catalyzed by ASTAE activities

The first indicator measures the number of Bank projects that were influenced by ASTAE activities and the related lending amounts. When these lending amounts are compared with the ASTAE disbursements made in a given period, the resulting number illustrates the leverage that donor funding had on Bank lending. This leverage can be seen as a good indicator of ASTAE funding's reach into Bank operations, thus providing a certain measure of ASTAE influence in channeling funds toward sustainable energy. The fiscal 2012–15 business plan aims to catalyze World Bank lending totaling US$3,200 million.

Indicator 2: New capacity and increased generation of renewable electricity

The second indicator measures the contribution of ASTAE activities to the increasing use of renewable energy in client countries. New renewable-energy generation capacity is expressed both in installed capacity, to reflect the actual investments made, and in actual energy generated, expressed in gigawatt-hours (GWh), to reflect use of the installed capacity. The relationship between a megawatt of renewable capacity installed and the GWh generated (and, therefore, the quantity of fossil fuel not used) differs from one project and one country to another because capacity factors and dispatch rules vary from one technology or country to another.

More specifically, this indicator integrates two sub-indicators: (a) new installed capacity in renewable energy (in megawatts, all technologies included); and (b) estimated annual quantity of electricity generated by the added renewable-energy capacity (in GWh).

ASTAE-supported projects under the fiscal 2012–15 business plan are targeted to contribute to the addition of 1,500 MW of renewable energy and the generation of 3,000 GWh annually from renewable sources.

Indicator 3: Electricity savings resulting from efficiency improvements

The contributions of ASTAE activities to saving energy through efficiency improvements are also measured. Energy-efficiency improvements can reduce peak load demand (and thus reduce or defer investments) and decrease energy consumption (less fuel used for an equivalent level of services or output provided). The electricity and heat-generation sectors recorded the most energy savings. A transformation coefficient is used to convert all savings, including of heat, into equivalent GWh of electricity. Efficiency improvements resulting in avoided capacity can provide relief to a constrained system, but a given MW of avoided capacity can result in various levels of energy savings, depending on the type of fuel used and country conditions.

More specifically, this indicator integrates two sub-indicators: (a) avoided energy-production capacity (in megawatts) resulting from efficiency improvements; and (b) estimated annual equivalent quantity of electricity (in gigawatt-hours) saved by energy-efficiency measures.

The fiscal 2012–15 business plan targets that ASTAE-supported projects will contribute to avoiding 1,000 MW of new capacity and energy savings equivalent to 3,000 GWh of electricity.

Indicator 4: Households with access to modern energy services

The fourth indicator measures the improvement in quality of life as households transition from traditional fuels (such as charcoal, wood, and dung) or inadequate modern fuels (such as kerosene for lighting) to modern, clean, and sustainable energy sources. When switching fuels is not possible or desirable, the indicator measures the improvement in delivery of energy services resulting from the project, such as improved quality or reliability of an electricity connection (for example, fewer blackouts and brownouts) or improved efficiency of a given activity (for example, using improved stoves to decrease wood consumption). Given their different nature and impacts, new access to electricity and improved access are tracked separately, as is access to efficient stoves.

More specifically, this indicator comprises three sub-indicators: (a) the number of households receiving new access to electricity, (b) the number of households receiving improved electricity, and (c) the number of households receiving improved access to efficient stoves for heating and cooking.

In the fiscal 2012–15 business plan, targets are set so that ASTAE-supported projects will contribute to (a) 2 million households receiving new access to electricity, (b) 1 million households receiving improved access to electricity, and (c) 5 million households receiving improved access to efficient stoves for heating and cooking.

Indicator 5: Avoided greenhouse gas emissions

The indicator for avoided greenhouse gas emissions spans the previous three pillar-specific indicators. Use of renewable energy and implementation of energy-efficiency measures directly decrease greenhouse gas emissions. Access to modern energy services has a more complex effect. In increasing access, some renewable fuels (wood, for example) may be displaced by fossil fuels, thus increasing emissions, but at the same time increasing caloric efficiency or improved sustainability of resources (less deforestation, for instance). The two effects may offset one another. Because of that uncertainty, the indicator for avoided greenhouse gas emissions is based primarily on the indicators for pillars 2 and 3. Impacts measured by this indicator, as well as the energy-efficiency-related indicator, are often achieved through cross-sector work, such as when ASTAE funds projects in the water or transport sectors.

More specifically, this indicator estimates the quantity of CO_2 emissions avoided over 20 years (the conventional lifespan of projects or equipment) through renewable-energy generation and energy savings registered under indicators 2 and 3. In the fiscal 2012–15 business plan, targets are set so that ASTAE-supported projects will contribute to emissions avoidance over 20 years of 200 million tons of CO_2.

Indicator 6: Countries benefiting from ASTAE support

An indicator for equitable support was added because the five indicators above can be met most simply by concentrating ASTAE interventions in larger countries. However, ignoring small countries is inequitable and prevents regional cooperation and sustainable development in the region as a whole. In addition, in some countries small-scale project operations rather than broader national policy programs are still the norm. Although such projects may not add much quantitatively to the first five indicators, they have large impacts on the quality of life of local populations.

The requirement for this indicator in the fiscal 2012–15 business plan is that a minimum of 15 countries receive ASTAE support.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ASTAE-Supported Activities during FY12: ALLOCATIONS, EXPENDITURES, AND COUNTRY UPDATES

FY12: Starting Activities under the New Business Plan

At the beginning of FY12, on July 11, 2011, the new ASTAE multidonor trust fund (MDTF) became effective and replaced single donor trust funds used in the past. This MDTF provides the implementing tool for the fiscal 2012–15 business plan (see chapter 3) that was prepared by the ASTAE team in collaboration with the Technical Advisory Group (TAG) and donors interested in providing funding. The fiscal 2012–15 business plan was presented at the ASTAE session of the 2011 Donors Consultative Group meeting.

In FY12, the ASTAE MDTF was endowed by two donors for a total of US$10,905,625:

- The Government of the Netherlands, with a deposit of US$8,000,000
- The Swedish International Development Agency (Sida) with a deposit of US$2,905,625

The Department for International Development of the United Kingdom also joined in FY13.

Overview of Allocations and Disbursements

With its MDTF in place in summer 2011 and funding received during the first half of FY12, ASTAE started calling for proposals and allocating funds to activities in fall 2011.

In FY12, ASTAE allocated US$4,459,000 to new activities and disbursed US$741,930. Allocation levels are as targeted for FY12 in the business plan, allowing for a rapid ramp-up of activities. The relatively low levels of disbursements are explained by the shortened window for activity in FY12 and the usual lag between allocation of funds and disbursements that are conditional on advancement and completion of the activity's tasks. However, with close to US$4.5 million allocated to activities in FY12, the pace of disbursements is expected to pick up in the coming years.

Allocations and Initial Disbursements

In FY12, ASTAE allocated funding to 16 activities in 9 countries and to 4 regional-level activities.

Consistent with the agreement with its donors, ASTAE funds are primarily allocated to support activities, with the remainder used for administrative and reporting purposes (table 2-1).

TABLE 2-1:
MAJOR ALLOCATIONS BY FUNDING CATEGORIES, FY12

ALLOCATION CATEGORY	AMOUNTS (US$)	PERCENT
ACTIVITY-RELATED FUNDING		
• COUNTRY-SPECIFIC ALLOCATIONS	3,169,000	65
• REGIONAL ACTIVITIES, KNOWLEDGE SHARING	1,290,000	26
ADMINISTRATION		
• FUND ADMINISTRATION AND REPORTING	343,000	7
• CENTRAL ADMINISTRATION	98,000	2
TOTAL	4,900,00	100

Given that FY12 marks the start of a funding cycle, the focus of this report is on allocations, which illustrate the trend and direction of work undertaken using ASTAE funds. In accordance with the administration agreement, ASTAE allocated 91 percent of its funding in FY12 to in-country or regional activities, for a total of US$4,459,000. The next section explains these country and regional allocations and the related initial disbursements in further detail.

With only US$960,043 disbursed, and disbursements differing significantly from allocations, FY12 is not a representative year, for multiple reasons. First, the

one-time central administrative fee of 2 percent is withdrawn by World Bank central services at receipt of the donor contribution, and is not based on disbursement levels. The high level of endowment received in FY12 mechanically led to a US$218,118 central services fee (of which only US$98,000 can be allocated to FY12) that inflates the FY12 central administrative costs. Second, with US$232,292 in FY12, ASTAE internal administration and reporting costs might appear high compared with total disbursements but these expenses remain within with the 7 percent agreement when compared with allocations to activities (7 percent of US$4.9 million is US$343,000). It is expected that in the coming years, disbursements will increase significantly and will better reflect the share and amounts allocated to activities.

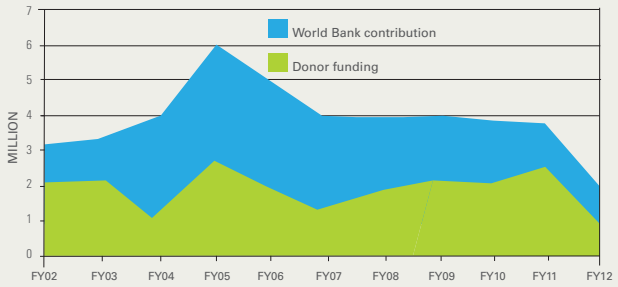
ASTAE Budget-Related Leverage

When ASTAE funds activities, the World Bank Group also contributes from its various budgetary sources to help carry out project tasks. This fund matching demonstrates the budget-related leverage that donor funding exercises in influencing World Bank projects.

Here again, FY12 is an atypical year, similar to FY04 or FY07 when the World Bank self-funded a significant portion of the project-related activities at the start of new business plan periods. The US$960,043 disbursed from the donor trust fund was complemented by US$1,034,339 from the World Bank, or 48 percent and 52 percent, respectively, of the total US$1,994,382 allocated to developing sustainable energy as a result of ASTAE-related activities. The respective World Bank and donor contributions since ASTAE's inception are provided in appendix table 3.1.

As shown in figure 2-1 and detailed in appendix table 3.1, both the absolute value of resource mobilization and the ratio of World Bank–to-donor contributions vary over the years. Changes in the pattern of donor contributions and variation in the number of sustainable energy projects in the World Bank lending pipeline or under implementation cause these fluctuations. FY12 shows a drop in total resource implementation, as well as in the ratio of the donor share. This change is due to the new funding cycle,

Figure 2-1: ASTAE Resource Implementation, by Origin of Funding



and both numbers are expected to increase significantly in the next few years.

Since its inception, ASTAE leverage has resulted in doubling, to more than US$68 million, the budget for identification, development, and supervision allocated to sustainable energy by the World Bank in Asia. This successful leveraging highlights the value of donor funding that enables World Bank task teams to undertake challenging activities for which Bank budgets are normally very limited, but that are nonetheless necessary for identifying and preparing future sustainable energy projects or to troubleshoot problems in ongoing projects.

Distribution of Activity-Specific Allocations

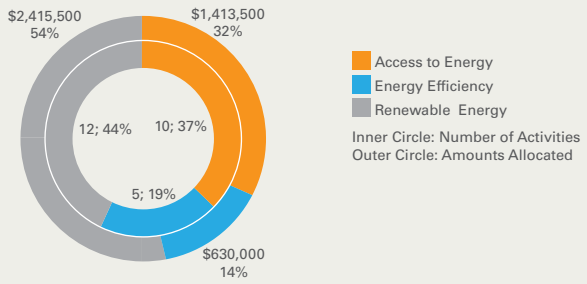
ASTAE allocated US$4,459,000 to activity implementation in FY12. This section focuses on the activity-related portion of allocations; it does not include administrative and reporting costs. To provide an analysis of the use of donor funds, ASTAE's activity-related allocations are broken down according to the key funding allocation metrics agreed upon in the business plan. These metrics are ASTAE pillars (figure 2-2); ASTAE countries (figure 2-3); type of execution; and supplementary themes such as cross-sector application, gender relevance, or early support to project development.

Activity-Related Allocations, by Pillar

In figure 2-2, the outer ring represents the amount allocated; the inner ring represents the number of ASTAE

activities related to an intervention pillar. An ASTAE activity can relate to several pillars, therefore, the sum of activities in the inner ring among all pillars may exceed the total number of activities supported by ASTAE. However, in this report, to avoid double counting of fund allocations, allocation amounts in U.S. dollars are allocated among pillars based on the activity task team estimate of the percentage of the work applicable to each pillar.

Figure 2-2: FY12 Allocations, by ASTAE Pillar



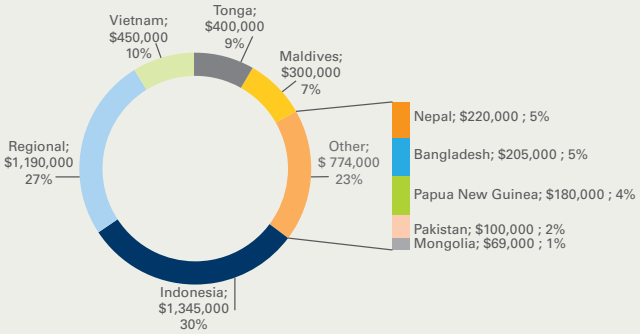
ASTAE allocations in FY12 by pillar (figure 2-2) reflect the higher allocations to renewable-energy-related activities, with 54 percent of the total funds and 12 activities. This is in line with the business plan target to allocate half of the funding to the development of renewable energy. Access to energy is the second area of focus, with close to one-third of funding. Allocations to energy efficiency were below the planned amount. It should be noted that 10 out of 16 activities combine several pillars, with the combination of energy access and renewable energy being the most frequent combination.

With regard to country distribution of work by pillar, activities or components relating to renewable energy were present in every country covered in FY12, and energy-efficiency-related activities were developed in only three countries. Access-related activities stand in between, being the focus or a component of ASTAE activities in six countries.

Activity-Related Allocations, by Country

In FY12, two-thirds of the funding was allocated to the East Asia and Pacific region (EAP) with the remaining third to the South Asia region (SAR). The map in appendix 1 shows which countries are covered by these World Bank–defined regions. The ratio of activities was nearly equal with a 55–45 split between EAP and SAR. The funding disparity reflects caution on the part of the ASTAE team, given that FY12 donors did not have SAR as their core focus. In addition, the use of ASTAE funds was a relatively new idea to the South Asia team, which called less frequently on ASTAE funds and also called for smaller amounts, as reflected in figure 2.3. This is expected to change in FY13 with the upcoming availability of UK Department for international Development funding that embraces SAR.

Figure 2-3: FY12 Allocations, by Country



The average amount allocated to activities has increased significantly from previous practice, to close to US$300,000 from an average of US$120,000. This reflects the increasing complexity of ASTAE-supported activities as well as the related growing trend toward multiyear implementation.

With four activities, regional work represented more than a quarter of the amount allocated, continuing its growth trend initiated in past business plans. Indonesia benefited the most from ASTAE funding, in part as a result of the

higher number of funding requests (three) and subsequent activities illustrating a dynamic portfolio. Small islands remain well represented, with Tonga and Maldives combining for 16 percent of funding.

With US$1,205,000 and 27 percent of allocations, support to International Development Association (IDA) countries remains below the targeted 40 percent of funds, in part as a result of the high levels of regional work (IDA countries represent 38 percent of allocations if only country-specific allocations are taken into account). In addition, in conformity with donor requests, no allocation to China was made in FY12, nor to India except as a minor share of regional work in SAR.

Activity-Related Allocations and Type of Execution

The fiscal 2012–15 business plan adds a new mode of execution for ASTAE activities by allowing for recipient execution in addition to the standard Bank execution, with a target of about 15 percent of allocations to be recipient executed.

In FY12, the first recipient-executed activity was initiated in Tonga, with a budget of US$400,000 or 9 percent of allocations. To minimize transaction costs and ensure smooth disbursements, this activity will be jointly implemented with a larger US$2.5 million recipient-executed grant provided by the Australian Agency for International Development (AusAID). The ASTAE-funded portion focuses on providing technical assistance to strengthen the recipient's implementation capacity.

Adding recipient execution increases the flexibility of ASTAE support to client countries. For example, in Tonga, ASTAE was initially requested to co-finance US$300,000 to complement an AusAID grant. However, during the negotiations for this project, the government of Tonga requested that the Bank finance a study to determine the technical and financial feasibility of installing a tidal power system in Vava'u to provide a substantial portion of the electricity for the island. ASTAE was able to provide additional financing of US$100,000 within one day through efficient communications between Tonga and Washington, DC, an example of how ASTAE can provide "just-in-time" support that few other programs can. This would not have been possible under Bank execution and may significantly increase the likelihood of better deployment of renewable energy in the country.

However, recipient execution is expected to remain a small portion of ASTAE funding because transaction costs are high for the relatively small grants that ASTAE can provide. Requirements related to procurement, financial management, or environmental and social safeguards, as well as the significant Bank supervision that these activities require, will limit the use of such recipient-executed activities to a narrow range of cases for which the gains from improved client engagement supersede these costs.

Activities that Contribute to Supplementary Themes

The fiscal 2012–15 business plan formalizes the contribution to supplementary themes that are now implemented and tracked by ASTAE in addition to its regular indicators. These supplementary themes relate to the support to and implementation of work that (a) facilitates cross-sector interactions, (b) contributes to the integration of the energy-water-food-security nexus, (c) enhances gender awareness and inclusion in projects, and (d) leverages private sector involvement.

Working on and including these supplementary themes is sometimes complex under regular Bank operations, and teams that have to focus on time-bound and energy-related outputs and impacts have difficulty finding the time and resources to explore alternative ways to deliver beyond their core stakeholders, even when they are interested in trying new approaches. Thus, building on a method that has proved successful in mainstreaming alternative energies, ASTAE will provide funding that can be used to add a component or a study related to these supplementary themes that will better inform a project. Alternatively, funding can also be used to test a new idea or methodology that does not yet have a project application but that may be mainstreamed later. The latter option provides a chance for teams to take a risk that would not be possible under tight Bank budgets but that could provide

high rewards in future Bank operations.

Facilitate Cross-Sector Interactions

In FY12, ASTAE funded two cross-sector activities with a combined total allocation of US$800,000. Cross-sector activities are usually activities that relate in one manner or another to energy but are handled, supervised, and implemented by teams from other sectors or units than the energy sector.

The first activity supported an initiative by the education sector that examined the development of innovative models to enhance access to renewable energy at the grass-roots level rather than through large-scale centralized initiatives. This initiative in Indonesia pilot tested technical and business support to small entrepreneurs in clean energy from the angle of working-adult-focused continuing education.

The second activity supported the continuation of previous work aiming at mitigating greenhouse gas emissions in the transport sector during construction of highways. Using previous ASTAE funding, a toolkit had been produced that helped road construction teams evaluate the different levels of emissions according to different construction methods. The new funding will enable the toolkit to be field tested in a specific road project in Vietnam to extend its use beyond construction to include the service phase in operations and maintenance, thereby getting closer to a real life-cycle analysis.

This attention to cross-sector collaboration will continue, and is likely to be extended in the coming years to other sectors, such as water or agriculture, with its focus on the energy-related dimension of cross-sector work.

Energy-Water-Food-Security Nexus

ASTAE will fund activities that enhance the understanding and integration of the energy-water-food-security nexus in Bank programs. Activities under this nexus can be handled by energy teams or by teams from other sectors, in which case they are also considered to be cross-sector. In FY12, engagement related to this nexus was undertaken with the Vietnam energy team, and efforts will be made to reach out to other sector teams in the future.

ASTAE allocated $450,000 to an activity that enables the energy sector in Vietnam to better analyze the impacts of hydro projects on related water, agriculture, and other stakeholders. The Cumulative Impact Assessment (CIA) activity on small hydropower projects in Vietnam will review all existing or reasonably foreseeable investments, facilities, or activities ("stressors") under the Renewable Energy Development Project that have impacts on the river flow regime or its water quality in six rivers and will conduct a risk ranking of additional cumulative impacts.

The team will identify the potential receptors of negative impacts from the operation of the stressors in the six rivers considered. This review will include all Valued Ecosystem Components (VECs) that could be significantly adversely (or positively) affected. In the project context, VECs would be mainly those most vulnerable to hydrological or water quality changes that affect the flow regime, aquatic and riverine ecosystems, and economic activities and livelihoods depending on water from the six rivers (for example, fisheries, irrigated agriculture). The nature of the impacts will be described and their scale assessed in a qualitative manner.

River stretches with a combination of VEC and significant effects on either flow regime or water quality will be evaluated for environmental and social impacts. The use of the river and the aquatic life for ecosystem services and economic dependency on the rivers by local communities will be assessed, including through consultations.

Based on the results of the detailed CIA and tests of mitigation measures, operational rules for each major hydraulic infrastructure scheme will be formulated to ensure joint use of water resources among key stakeholders, including but not limited to energy, water, and agriculture users. The main objective of the proposed operational rules will be to optimize joint management of the basin. Existing schemes and agreed-on rules will be taken into account as much as possible to enable applicable rules and wide ownership.

Enhance Gender Awareness and Inclusion in Projects

Systematic engagement with the social teams in EAP was begun in FY12, with a contribution to the region's gender action plan that led to specific gender-related activities in the following fiscal year. In FY12, one activity, with a budget of $500,000 had significant gender and pro-poor dimensions.

The education sector–led activity targeting innovation capacity in clean energy in Indonesia will address gender issues in the use of energy-related products and services by integrating a gender-sensitive approach into both the needs identification (demand) and the design-related response (supply) phases. Many products and services that are currently in use in rural communities in Indonesia (and in other developing countries), or are marketed by businesses and nongovernmental organizations, do not consider gender-specific issues. In many cases, energy products and services are designed with a limited understanding of the actual and cultural-specific needs of the women who will be using them. All-male research and design teams often develop only a limited understanding of needs as a result of communication barriers with women.

The program will address gender issues by targeting energy-related challenges for which women are the lead users. One example being addressed by the program is biomass cookstoves for home industries. The program will also address these gender issues by including women in the design team (which will also promote the development of women as green energy design professionals), by researching the specific needs of women during the research stage, by involving women in the co-creation process, by testing market solutions with women, and by assessing the impact of specific market solutions on gender issues. Finally, the program will address gender issues by targeting support to women entrepreneurs and promoting the inclusion of women in the choice of business mentors.

Following the pilot work, a toolkit for pro-poor, clean-energy, human-centered design will be developed and disseminated in Indonesia and globally. The toolkit will include special focus sections on gender issues in human-centered design.

Leverage Private Sector Involvement

The impact of ASTAE-funded activities on private sector development and involvement is only partially captured by the current monitoring system, which focuses on leverage of Bank projects that, by definition, are primarily implemented with and often by the government or its state-owned utilities. During its lifetime, ASTAE-supported Bank projects have registered contributions of about US$1.2 billion from the private sector; or about 22 percent of the total US$5.2 billion leveraged, an amount roughly equivalent to that provided by the governments. However, as can be seen in appendix table 4.1, this contribution mainly came from large-scale projects in China; therefore, with ASTAE's withdrawal of involvement in China, this leverage of the private sector is likely to greatly diminish.

In fact, private sector involvement is expected to be higher in middle-income countries with opening markets than in IDA countries that often do not have the right frameworks and policies in place and constitute riskier markets. ASTAE will increase its attention to better tracking of the impact of upcoming activities and projects in a qualitative fashion, in addition to the hard investment numbers. However, these qualitative appraisals will be undertaken guardedly, given that past attempts to measure "indirect leverage," in the absence of a clear metric or methodology, were at times impossible to substantiate.

Under the fiscal 2012–15 business plan, two qualitative examples of ASTAE-financed activity with high potential for private sector leverage can be provided. The first is current ASTAE support to the development of a third-party access code in Papua New Guinea to attract private sector investment and independent power producers in a more efficient manner. Access to electricity in Papua New Guinea is very low, at less than 10 percent of the population, and essentially limited to major urban areas. Some 87 percent of the total population of Papua New Guinea lives in rural areas where electricity access is scarce. Although urban

areas have access to electricity, supply is characterized as unreliable and often unaffordable. Papua New Guinea's Electricity Industry Policy intends to address the problem by opening up competition in the industry so that households have better access to a reliable and affordable supply of electricity with sufficient power generated and distributed to meet future energy requirements. The development of the third-party access code will establish a framework for interested investors to access electricity transmission and distribution networks, with the objective of introducing further competitive avenues for the supply of electricity within Papua New Guinea.

The second example of private sector involvement can be found in the Indonesia Renewable Energy for Electrification project. In this project, ASTAE funding, in addition to providing technology mapping and a least-cost electrification plan for the use of renewable energy, is also aiming to produce a bankable prospectus. The prospectus would be prepared to fund the financing gap through syndication and related capacity strengthening by donors and interested private sector participants. The prospectus would include detailed annexes as appropriate to make a clear, compelling, and credible case to the donors and to the private sector for filling the projected financing gap. In addition, the prospectus will identify, in sufficient detail, the implementation plan and the monitoring and evaluation and oversight mechanisms proposed to track performance, implementation progress, and results on the ground.

Description of Activities Funded in FY12, by Country

Table 2-2 provides an overview of the16 ASTAE activities for which funds were allocated in FY12, as well as a short description of the support mechanisms provided by ASTAE for these activities.

Given the diversity of countries in SAR and EAP, a map and an at-a-glance country and context summary for each of ASTAE's pillars are provided in appendix 1, including the following for each country:

- Basic information: population and GDP
- Renewable energy: capacity, generation, and market share
- Energy efficiency: energy intensity in GDP and in power generation, measured by CO_2 emissions
- Access: population electrified in number and rate
- Greenhouse gas emissions: annual CO_2 emissions and ranking.

TABLE 2-2: DETAIL OF ASTAE ACTIVITIES AND ALLOCATIONS BY COUNTRY, FY12

	ASTAE ACTIVITY	TYPE AND DETAILS OF ACTIVITY	FY12 ALLOCATIONS
		PERIOD TOTAL	**$4,900,000**
BANGLADESH			**$205,000**
1	Unleashing the Potential for Renewable Energy	• Identify economically viable renewable energy sources for electricity supply • Help provide an action plan to implement these sources during 2012–30	$200,000
2	Showcasing Results of World Bank–Supported Intervention in Rural Electrification	• Support the production of a movie highlighting the successes of the Bank-funded Solar Home System program in Bangladesh	$5,000
INDONESIA			**$1,345,000**
3	Building Innovation Capacity in Clean Energy	• Support the emergence of clean energy entrepreneurs • Design an identification process that favors pro-poor and gender sensitive clean energy market solutions • Disseminate lessons learned in the process	$500,000
4	Geothermal Power Development Program II	• Assist in review, design, and consensus building for policy reforms in the geothermal sector • Enhance government capacity to integrate Clean Development Mechanism in geothermal development • Assist in identifying and preparing geothermal projects to be financed by World Bank loan	$495,000
5	Renewable Energy Access Improvement	• Support technology mapping and least-cost electrification plan • Prepare bankable prospectus for funding the financing gap through syndication	$350,000
MALDIVES			**$200,000**
6	Clean Energy Development and Regulatory Support	• Support the government for timely achievement of the Clean Energy for Climate Mitigation project • Help design a comprehensive regulatory framework • Build the capacity of the Maldives Energy Authority	$ 200,000
MONGOLIA			**$69,000**
7	Enhance Awareness of Electrification of Rural Herders through Solar Home Systems	• Raise the awareness in Mongolia of the impact and benefits of the 100,000 Solar Ger Electrification Program • Extract lessons of a successful example of applying internationally proven practices in rural electrification	$69,000
NEPAL			**$220,000**
8	Sustainable Hydropower Development	• Build local technical capacity in hydropower on geotechnical, risk management, and environmental issues and sediment management • Provide advisory services to the Bank-financed Rehabilitation of Kali Gandaki A Hydropower Plant	$200,000
PAKISTAN			**$100,000**
9	Natural Gas Loss Reduction	• Reduce the physical and commercial losses of gas in the pipeline system of one of the country's two gas transmission and distribution utilities	$100,000

	ASTAE ACTIVITY	TYPE AND DETAILS OF ACTIVITY	FY12 ALLOCATIONS
PAPUA NEW GUINEA			**$180,000**
10	Development of a Third-Party Access Code for the Transmission and Distribution Networks	• Assess the key elements necessary necessary for a third-party access code • Support the Independent Consumer and Competition Commission in developing a code to facilitate third-party (potential electricity providers entry) access to the existing transmission and distribution network	$180,000
TONGA			**$400,000**
11	Tonga Energy Roadmap	Recipient Executed • Provide international experts for technical advice to the Tonga Energy Road Map Implementation Unit • Undertake a feasibility study for tidal power system in Vava'u island	$400,000
VIETNAM			**$450,000**
12	Cumulative Impact Assessment of Small Hydropower Projects on River Cascades	• Screen all rivers for potential significant cumulative impacts • Prepare detailed Cumulative Impact Assessment for selected rivers • Develop joint operation rules for selected river	$450,000
REGIONAL PROJECTS, OUTREACH AND KNOWLEDGE SHARING			**$1,190,000**
13	Greenhouse Gas Emission Mitigation in Road Transport: Toolkit Implementation and Life-Cycle Analysis	• Extend the existing toolkit (developed by ASTAE) to include the road service phase for operations and maintenance • Field test the toolkit to determine user friendliness and full-scale operation at all phases, including planning, design, and construction or rehabilitation	$300,000
14	Access to Electricity Solutions in South Asia Region	• Examine the constraining factors to access expansion in lagging states in India and countries in South Asia • Support the development of the access pillar of the South Asia energy team strategy and link with the Sustainable Energy for All (SE4ALL) program	$300,000
15	Develop a Household Energy Strategy in South Asia Region	• Develop a strategy and action plan for the World Bank's South Asia Energy Unit to support client countries in promoting clean and efficient biomass cookstoves	$300,000
16	Using Satellite Imagery to Monitor Progress of Rural Electrification	• Validate technology by reviewing past electrification programs • Develop a monitoring methodology for ongoing or future Bank-supported electrification programs.	$340,000
ADMINISTRATION AND REPORTING ACTIVITIES			**$442,000**
	Fund Administration and Reporting Activities	• ASTAE staff • Administrative and business development support • Technical Advisory Group support • Printing and editing services	$343,000
	Central Administration	• Central Administration Fee	$98,000

The following sections highlight ASTAE-supported activities that received allocation in fiscal 2012, as shown in table 2-2.

Bangladesh: Unleashing the Potential for Renewable Energy

This activity supports Bangladesh's nascent Sustainable Energy Development Agency in its effort to establish the country's economically feasible renewable-energy capacity. Bangladesh's renewable-energy policy (2008) aims to meet 10 percent of the country's energy demand using renewable-energy sources. This target is ambitious given that the current share of renewable energy is less than 1 percent of total power generation in the country. The study is helping identify economically feasible renewable-energy options for electricity supply and will provide an action plan for tapping this renewable-energy potential over the period 2012–30 in support of achieving the target. The study is examining the potential that can be economically developed and will specify the activities that need to be undertaken to better benefit from the country's renewable-energy potential.

Bangladesh: Showcasing Results in World Bank–Supported Intervention in Rural Electrification

This activity provided just-in-time support to the Bangladesh country team to showcase the impact on the beneficiaries of the Solar Home Systems (SHS) program in Bangladesh. The SHS program, as part of the Rural Electrification and Renewable Energy Development Project (RERED), contributed directly to increasing access targets under the Bank country assistance strategy; therefore, RERED was selected to be featured in a short video showcasing the life stories of people that benefited from programs supported by the World Bank. The video highlighted the gender and poverty dimensions of the SHS program. It helped document the success stories of the SHS program, which will, in turn, help secure additional funding from development partners for continuing the scale-up of the program to achieve the target of 2.5 million SHS by 2015.

The Bangladesh SHS program, which benefited from ASTAE support in 2001 for market assessment and development of the program design, successfully provided access to electricity in remote rural areas of Bangladesh to more than a million households, far exceeding the initial target of 50,000 systems in a five-year period.

Indonesia: Leveraging Global Knowledge Networks for Innovation Capacity in Clean Energy

This pilot program, supported by the Green Growth Knowledge Platform of the World Bank, aims to foster the creation and growth of high-impact business ventures by combining (a) hands-on and advisory support to entrepreneurs and (b) design solutions for the grassroots clean energy needs of low-income rural communities in Indonesia that can be implemented by the private sector.

The advisory part of the program offers support to competitively selected actual and aspiring entrepreneurs. All support will be provided at no cost to the client. Support includes advice on business planning, sales and marketing, financing and funding strategy, human resources, financial management, accounting, taxes, legal and intellectual property, company registration, product development and marketing, operations and manufacturing, customer relationship management, and strategic partnerships. The project provides practical short-term entrepreneurship learning programs to entrepreneurs through local sources and from global experts through webinars.

New entrepreneurs are paired with business mentors and advisory boards drawn from the entrepreneurs' communities as well as from other relevant global economies. These mentors and advisory boards provide Indonesian entrepreneurs with the global networks and advice from seasoned global entrepreneurs that they need to grow sustainable high-impact businesses. The program will also provide entrepreneurs with access to technical advisory services from local technology experts and from global technology experts.

The grassroots design part of the program calls for ideas for clean energy challenges to be solved by the pilot program to be collected from communities, nonprofits, and government agencies. Final challenges will be selected by a review panel on the basis of the potential impact of addressing the challenge. Global, human-centered design teams will then be paired with local partners, such as research institutions and universities, which will be hired as consultants, and enterprises and nonprofits that are ready to invest their time and efforts in the design project. Together, they will develop and implement solutions for the selected challenges. Throughout the process, design teams will provide training on human-centered design to local partners and will work with local, national, and global private sectors to ensure diffusion of the approach at the program's end.

Throughout the program, the selection of female entrepreneurs will be strongly supported and female mentors will be sought to share their gender-specific experiences in the traditionally male-dominated business areas. The project aims to have at least one-quarter of the screened entrepreneurs be female.

Indonesia: Geothermal Power Development Program II

ASTAE is providing ongoing support to help Indonesia achieve the government's ambitious target of 4,000 MW of geothermal power capacity as a part of the government's Second 10,000 MW Fast-Track Program. Past ASTAE support contributed to a number of achievements, for example, US$300 million in World Bank and Clean Technology Fund (CTF) loans (the first CTF operation in East Asia) and Pertamina Geothermal Energy (PGE), a leading geothermal developer, to develop about 150 MW of geothermal capacity (about a 10 percent increase in Indonesia's overall capacity), as a part of the Geothermal Clean Energy Investment Project further described in chapter 3. New ASTAE funds will provide critical incremental technical assistance to consolidate and build upon the achievements to date that have kick-started development, and will help advance the geothermal development agenda in Indonesia to the next important phase with a view to longer-term sustainability of the globally unprecedented scale-up.

Indonesia: Renewable Energy for Electrification - Thousand Islands Solar Photovoltaic

This activity will help the government and the bilateral and multilateral lending agencies come together to develop a workable framework for a renewable-energy approach to electrification planning. The planning will use technology mapping to develop a least-cost electrification plan and a sector investment and implementation plan. The government of Indonesia has announced its desire to reduce carbon emissions by 26 percent by 2020. To achieve this objective, the government is exploring low-carbon development growth options, particularly in the energy sector. In addition, the government has pledged to achieve close to 95 percent electricity access by 2025, from the 74 percent in 2012. Therefore, the government has embarked upon a 1,000 island electrification program in an effort to improve electricity access in its Eastern Islands region by using primarily renewable energy technology. ASTAE previously supported background work to identify the project scope through an up-front rapid data assessment that assembled and reviewed key sector data and relevant information to provide a comprehensive and substantiated factual basis—in scope and coverage—essential to the design of the project concept by the Bank.

Mongolia: Enhance Awareness of Electrification of Rural Herders through Solar Home Systems

This activity through a video and other dissemination activities of the Renewable Energy and Rural Electricity Access Project (REAP), will raise the awareness in Mongolia of the impact and benefits of the National 100,000 Solar Ger Electrification Program. The aim of the project is to provide electricity access using solar home systems to 100,000 mobile herders who sparsely populate Mongolia's vast rural areas. It will also inform the global development community by extracting the lessons from a successful example of the application of internationally proven practices in rural electrification to fit the unique circumstances in Mongolia. ASTAE provided key support to REAP during its initial implementation period in FY2007–08.

Nepal: Support to Sustainable Hydropower Development

This activity will assist the World Bank Group's ongoing involvement in Nepal's renewable-energy sector development through lending and nonlending activities, especially in hydropower. Only 46 percent of the population in Nepal has access to electricity, and increasing access to reliable electricity is one of the most significant development challenges facing the country. Although the total installed capacity is close to 700 MW, the actual available capacity is much lower, especially in the winter because of the precarious seasonal nature of the river flows that dictate power production in Nepal's predominantly run-of-the-river hydropower projects. There is only one storage project in the country (the Kulekhani hydropower project), and additional storage projects, both for meeting the winter shortage and for export in the wet months, is much desired. The country suffers from a perpetual power shortage; in the worst cases, electricity is available only a few hours per day in the winter months. ASTAE will fund technical capacity building for planning and developing sustainable hydropower projects in the country, including technical capacity building in hydropower and advisory services to Bank-financed projects such as the Kabeli "A" hydroelectric project.

Pakistan: Natural Gas Loss Reduction

This activity will support the Natural Gas Efficiency Project that will enhance the supply of natural gas in Pakistan by reducing the physical and commercial losses of gas in the pipeline system of one of the country's two gas transmission and distribution utilities. Losses are more than 9 percent as compared with 1–2 percent in well-run gas networks. Indications from pilot projects are that at least 75 percent is methane leakage to the atmosphere; the other large component is gas theft. The project will bring the utility's gas losses (unaccounted-for gas) down to about 5 percent, thereby reducing methane emissions to the atmosphere and improving resource management, making natural gas more affordable, and improving service delivery. ASTAE will provide assistance to the project management office of the subborrower (the gas utility) in the critical start-up phase of the project to ensure thorough analysis of and discussions on organizational requirements for successful execution; to provide advice on strategic project execution matters, notably the segmentation of the network into smaller units; and to support pilot projects with energy-efficient consumer appliances. The consumer appliance pilot projects are funded by the International Bank for Reconstruction and Development (IBRD) and IDA, but scaled up with Global Environment Facility (GEF) funds, and may help unleash further savings of gas resources and emissions. The Pakistan government's main goal in the energy sector is to increase the affordability and availability of energy, with a priority focus on electricity services and an associated focus on reducing dependence on costly oil imports. The project is seen as a remedy to some of the problems of the sector because it aims to make more natural gas cost-effectively available for economic use, including for thermal power plants, while at the same time reducing emissions of greenhouse gases.

Papua New Guinea: Assessing the Key Elements for the Development of a Third-Party Access Code for the Transmission and Distribution Networks

This activity will help the Independent Consumer and Competition Commission (ICCC) develop a code to facilitate third-party access to the existing transmission, distribution, and retail electricity network of PNG Power to address the current reliability problem. The third-party access code will allow other electricity service providers, such as independent power producers or transmission companies transporting energy from PNG Power or independent power producing generators, to connect to PNG Power's existing transmission facilities and compete with PNG Power in the generation of electricity. The government of Papua New Guinea has approved an Electricity Industry Policy (EIP). Among the key initiatives under this policy is to develop the third-party access code. The government of Papua New Guinea has requested that the ICCC, as the economic and licensing regulator of the electricity industry, develop this third-party access code in early 2012.

Access to electricity in Papua New Guinea is very low, essentially limited to major urban areas, whereas 87 percent of the total population of Papua New Guinea lives in rural areas where access to electricity is sparse. Although urban areas have access to electricity, its supply is characterized as unreliable and often unaffordable, with limited access. The current EIP intends to address these problems by opening up the electricity industry to competition to facilitate the government's policy under the Papua New Guinea Development Strategic Plan 2010–2030 to ensure that households have better access to a reliable and affordable electricity supply with sufficient power to meet future energy requirements. The major outcome of the ASTAE-supported activities will be a framework for third-party access to electricity transmission and distribution networks, with the objective of introducing further competitive avenues for electricity supply within Papua New Guinea, which will, in turn, promote the economically efficient investment in, operation of, and use of networks and generation plants, and allow new electricity services to support such access.

Tonga: Energy Road Map Institutional and Regulatory Framework Strengthening

This is ASTAE's first recipient-executed activity, cofinanced with AusAID through the multipartner Pacific Region Infrastructure Facility and the government of Tonga. This activity will help Tonga implement "Tonga Energy Road Map 2010–2020" (TERM). TERM experience has brought together more than a dozen development partners around a common agenda, and in so doing has served to recall and redefine a methodology that has colloquially become known as an innovative "whole-of-sector" approach to energy planning and investment for a small island state.

ASTAE will finance renewable-energy and energy-efficiency experts to help the government of Tonga implement the project and to fund an innovative tidal power feasibility study. ASTAE will provide financing to component 1 of the project on capacity building to strengthen the energy sector framework and structure. Component 2 will help Tonga Power Limited integrate renewable energy into the grids.

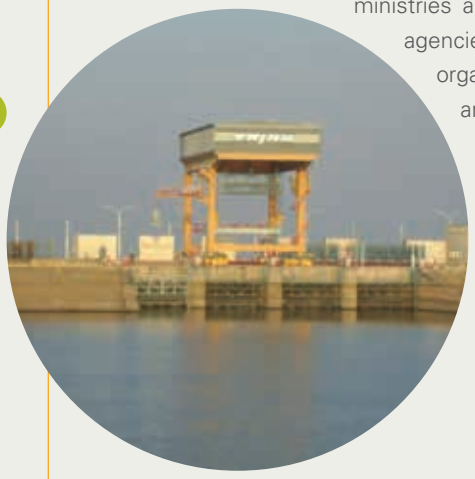
Vietnam: Cumulative Impact Assessment on Small Hydropower Projects on River Cascades

This ASTAE-funded activity will conduct a Cumulative Impact Assessment (CIA) and develop Joint Operational Rules for Hydropower Operators on various river cascades under the Renewable Energy Development Project (REDP) in Vietnam. This activity will contribute to mitigating potential negative impacts on the energy-water-food-security nexus. The activity will screen all socioeconomic impacts of hydropower development on the cascade, including on irrigation, agriculture, and, indirectly, food. The REDP facility will finance about 30 small hydropower developments; however, there currently are no provisions to carry out CIAs or develop joint operational rules to maximize generation output on river cascades while maintaining the minimum environmental flow to mitigate negative impacts.

The study, which will be managed by the Ministry of Industry and Trade (MOIT), will build capacity and raise awareness—at the state, provincial, and municipal levels, and with private developers—of the benefits of conducting CIAs before constructing hydropower plants. The study will highlight the need to develop an appropriate institutional and regulatory setup to ensure CIAs are conducted as part of standard river management and hydropower development planning in Vietnam. Based on the estimated physical cumulative impacts in the river basins, stretches with a combination of valued ecosystem components and significant effects on flow regime or water quality will be assessed in regard to environmental or social impacts. Potential effects on aquatic biodiversity will be estimated based on the existing studies. If necessary, sampling of fish and other aquatic species will be conducted. In situ water quality measurements should be conducted to complement the measurements taken during the screening phase. In parallel, the use of the river and the aquatic life for ecosystem services by local communities will be assessed through consultations. Economic dependence on the rivers and the potential impacts of the simulated physical cumulative impacts under the different development scenarios will be estimated.

Vietnam: Cumulative Impact Assessment on Small Hydropower Projects on River Cascades (continued)

As part of the socioeconomic assessment, the study will specifically address the gender impacts of hydropower development under the project. A well-organized start-up workshop was held on June 21, 2012, in Hanoi to (a) introduce the project to all relevant stakeholders and (b) share lessons from international experience in developing cumulative impact assessment and joint operational rules. The workshop was opened by MOIT and the World Bank with more than 50 participants from various ministries and other government agencies, nongovernmental organizations, institutes, and other relevant stakeholders.



Regional: Greenhouse Gas Emission Mitigation in Road Transport: Toolkit Implementation and Life-Cycle Analysis

This activity aims at (a) developing an implementation framework for the integration of Road Emission Optimization (ROADEO, a toolkit produced under ASTAE's 2007–11 business plan) into the Vietnam Road Asset Management Program's monitoring and evaluation plan and (b) extending the existing toolkit to include the road service phase for operations and maintenance.

Through the first objective, this activity will field test the existing toolkit in an effort to determine user friendliness and full-scale operation at all phases, including planning, design, and construction or rehabilitation. Through the second objective, this activity intends to leverage funding to include all phases of a road's life-cycle to make the existing toolkit truly comprehensive. Verification using the ROADEO software is expected to eventually come to fruition through widespread usage and international acceptance.

Previously, ASTAE supported the emergence and development of the ROADEO toolkit, which attracted considerable interest from World Bank operational teams in several regions. This time, ASTAE will help operationalize the ROADEO toolkit in World Bank lending projects and eventually beyond Bank projects.

Regional: Access to Electricity Solutions in South Asia

This activity will examine the factors that constrain access expansion in lagging states in India and countries in South Asia and propose a way forward to reach universal access to electricity in 2030, as envisaged under the sustainable energy for all (SE4ALL) initiative. Although a number of national and international platforms are focused on the provision of electricity to clientele at the bottom of the pyramid, a strong analytic underpinning is required to determine the reasons behind continuing poor performance and to suggest implementable solutions drawing on international best practices. This activity will support the access pillar of the Bank's South Asia Energy Sector Strategy and builds on the work carried out under the umbrella India Power Sector Diagnostic Review. This activity will review access-related issues in South Asian countries in general and particularly in India with a view to informing the future operational agenda.

Regional: Household Energy in South Asia Region

This activity will help develop a strategy and action plan for the World Bank's South Asia Energy Unit to support client countries in promoting clean and efficient biomass cookstove with an initial focus on Bangladesh and Nepal. The ultimate beneficiaries of this work will be poor households, particularly the women and children in those households, who suffer more heavily from the smoke from traditional cookstoves.

Regional: Using Satellite Imagery to Monitor Progress of Rural Electrification

This activity aims to replicate the lessons learned in Senegal and Mali, where it was demonstrated that satellite imagery is a valid and efficient tool for tracking and monitoring the progress of rural electrification projects. The study analyzed in detail the technical conditions and related costs for satellite monitoring and provided an on-the-ground cross-check of results provided by satellite imagery. Building on the proof of concept and feasibility in Africa, ASTAE funding will support the operational use of such imagery in Asia with a focus on Vietnam, Indonesia, Nepal, and Bangladesh. The activity is led by SAR but implemented jointly in SAR and EAP.

The activity will have two major components: (a) an ex post analysis to glean lessons learned from several national programs in Asia, such as in Vietnam, that have shown substantial progress in electrification, and (b) forward-looking support for the setup of a monitoring component for ongoing or future Bank-supported electrification programs in Asia, such as in Indonesia and Nepal. Expected outputs are a lessons learned report and a methodology toolkit ready to be implemented in the country of focus and to be shared with teams in other countries.

ASTAE Team and Publications in FY12

Composition of ASTAE Team

The ASTAE team comprised the following members in fiscal 2012:

- Mr. N. Vijay Jagannathan, sector manager for the East Asia Infrastructure Unit (EASIN), has been the ASTAE program manager since July 2009. He retired in July 2012 and was replaced by Mr. Charles M. Feinstein.
- Ms. Jyoti Shukla, Sector Manager, South Asia Energy Unit (SASDE) oversaw activities in South Asia.
- Ms. Natsuko Toba, senior economist in EASIN, has been ASTAE coordinator since May 2010.
- Mr. Dejan Ostojic, energy practice leader in EASIN, provided strategic support to the program manager and the coordinator for activities in East Asia and the Pacific.
- Ms. Sudeshna Banerjee, senior economist, provided strategic support to the program manager and the coordinator for activities in South Asia until December 2011.
- Mr. Laurent Durix, senior energy consultant, provided technical support to the program manager and the coordinator and now coordinates activities in South Asia.
- Mr. Sivalingam Milton, procurement assistant, provided office support.

Ms. Toba and Mr. Durix undertake the majority of the administration and development tasks and thus are the only staff members to charge such task-related costs to the ASTAE trust fund.

Publications Produced

ASTAE activities produce a number of outputs in various formats, depending on the target audience and the best way to deliver information to each audience. Most reports are by-products of activities funded by ASTAE, although some are the end products. When suitable, the products are published, printed, and widely distributed to a broader audience, including through ASTAE's website. Many reports are not published, either because their value to the general public is limited or because they are confidential outputs delivered to partner countries. The purpose of each publication is to share—within and among countries in the region and beyond—the knowledge and experiences, especially innovative ones, generated by ASTAE activities.

Given the interim nature of FY12, ASTAE published only one report:

- Lao PDR, Power to the People: Twenty Years of National Electrification, December 2011

3

ASTAE Performance Assessment—FISCAL 2012–15 BUSINESS PLAN

Chapter 2 dealt specifically with ASTAE's activities in FY12. This chapter reviews the plans for performance of ASTAE-funded projects for the four years of the fiscal 2012–15 business plan period.

ASTAE Leverage on Bank Lending

The allocations ASTAE provides to Bank teams to undertake activities leverage additional investment in sustainable energy once ASTAE-supported projects have been appraised, approved, and implemented. These leveraged amounts vary from year to year because the number and size of World Bank projects presented to the Board vary and ASTAE activities sometimes inform Bank projects that come to the Board only years later. Caution must be exercised when referring to such leverage—claiming full ASTAE attribution would be unrealistic and unfair to all those involved in developing the projects, starting with the governments and the Bank Task Team Leaders.

However, such leverage can be seen as a good indicator of ASTAE funding's reach into Bank operations, thus providing a certain measure of ASTAE's influence in channeling funds toward sustainable energy. This leverage is especially important in periods of flat budgets, when the institutional appetite is decreased for the type of less mainstream, innovative projects—often perceived as riskier and costlier—required to promote the adoption of sustainable energy solutions. By contrast, availability of ASTAE funds ensures the study will be conducted, the consultant hired, or the concept tested that will nudge the decision-making process to the finish line.

During the 2007–11 business plan period, ASTAE supported 17 projects that had been presented to the World Bank Board of Executive Directors. The total lending related to these projects amounted to US$2.2 billion, of which 51 percent was sourced from the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA), and the rest from borrowing countries' governments, other donors, and the private sector.

In contrast to FY11, when no ASTAE-supported project came to the Board, FY12 was a very active time. Five ASTAE-supported projects were approved by the Board for a total of US$1,301 million. All projects but one had benefited from ASTAE support under the 2007–11 business plan period, but are accounted for under the 2012–15 business plan because the key marker for allocation of the related indicators to a given fiscal year is the date of Board approval.

The five approved ASTAE-supported projects follow, sorted by approval date:

- July 2011, Vietnam, Clean Production and Energy Efficiency Project
- July 2011, Indonesia, Geothermal Clean Energy Investment Project
- September 2011, China, Energy Efficiency Financing III Project
- April 2012, Mongolia, Ulaanbaatar Clean Air Project
- April 2012, Pakistan, Natural Gas Efficiency Project

Vietnam, Clean Production and Energy Efficiency Project

The Clean Production and Energy Efficiency Project is a Global Environment Facility– (GEF-) funded project, with a total cost of US$4.14 million (partially funded by a GEF grant of US$2.37 million), the objective of which is to strengthen the capacity of the Vietnam government and other key stakeholders for the effective delivery of the national energy-efficiency program in key industrial sectors, thereby improving energy efficiency and reducing associated greenhouse gas emissions.

The energy sector in Vietnam has grown rapidly to meet the demands of a developing nation. Final energy

consumption grew from 10.8 million tons of oil equivalent in 1998 to 32.5 million tons of oil equivalent in 2008. Industrial growth has been one of the key drivers of Vietnam's increasing energy intensity. These rapid increases in energy consumption and energy intensity of economic growth present the country with triple reasons for a robust energy-efficiency program: (a) energy supply security, (b) competitive economic growth, and (c) sustainable environmental development.

The Vietnam Energy Efficiency Program (VNEEP) is a national target program, and the first-ever comprehensive plan to institute measures for improving energy efficiency and conservation in all sectors of the economy in Vietnam. VNEEP Phase I (VNEEP-I), 2006–10, aimed to start up all components of the program, and VNEEP Phase II (VNEEP-II), 2011–15, aims to expand each component, based on lessons learned from Phase I.

The proposed GEF project is intended to provide technical assistance to participants in the energy efficiency market (with specific emphasis on the industry sector and energy services providers) as well as to the Ministry of Industry and Trade (MOIT) and to support the government in achieving the energy-efficiency targets of the national energy-efficiency program through various delivery mechanisms. This will be a substantial undertaking for the government in the next several years because it requires a paradigm shift from growth through investment in new capacity and use of additional resources to growth through better use of existing capacity and resources. This GEF project will also support pre-investment activities such as developing action plans, building capacity, and establishing policy support mechanisms to attract and enable financing programs. Implementation of a national energy-efficiency program involves long-term engagement and approaches for addressing the key issues and gaps that could influence the success of investment projects.

The project consists of the following components: (a) establishment of energy-efficiency action plans for key industrial sectors, (b) development of energy services providers, and (c) capacity building for program management and supervision.

ASTAE provided technical assistance during the preparation phase of the project to help the team review and provide technical advice on activities proposed by the Vietnam government under the different components of VNEEP-II. An experienced energy-efficiency expert was hired to work closely with MOIT and local counterparts to provide advice and recommendations for both the preparation and implementation phases of the component project and to build the capacity of MOIT staff.

ASTAE also organized an exchange of experiences with energy services companies (ESCOs) from China and Thailand at workshops in Hanoi attended by local authorities and other stakeholders from other cities (Ho Chi Minh, Haiphong, and elsewhere). A study tour to the Republic of Korea was conducted for a Vietnamese delegation from MOIT. The objective of these activities was to boost the business by redressing local partners' lack of practical experience through discussion of business opportunities, business models, and creation of collaboration opportunities with Vietnamese counterparts.

Indonesia, Geothermal Clean Energy Investment Project

The approval of this project by the Board in July 2011, for a total of US$574.7 million, marked the positive investment leveraging of long-term ASTAE support to geothermal development in Indonesia. The objective of the project is to increase power generation from renewable geothermal resources by supporting investment in the development and construction of 150 MW of geothermal energy that will reduce local and global environmental impacts. This will be achieved by assisting Pertamina Geothermal Energy (PGE), a leading public sector geothermal developer, expand power generation capacity in the Ulubelu and Lahendong (Tompaso) geothermal fields located in South Sumatra and North Sulawesi, respectively. The successful realization of new geothermal power generation capacity will provide an estimated avoidance of greenhouse gases (GHGs; for example, CO_2) and local air pollutants (SO_2, NO_x, TSP), when compared with equivalent coal-based power development. It was estimated that the 150 MW would mitigate 22 million tons of CO_2 over a 20-year period.

The World Bank provided loans totaling US$300 million to PGE to develop the geothermal capacity and kick-start the scale-up. It included US$175 million from the IBRD middle-income country borrowing facility and concessionary financing from the Clean Technology Fund (CTF). The loan to PGE was the first CTF operation in East Asia.

ASTAE played a critical role, along with complementary grant support provided directly to the client by the government of the Netherlands, in helping PGE prepare a number of investment projects to meet international and industry standards. As a first-time client of the World Bank, PGE also benefited from the capacity-building efforts made possible by ASTAE support. This support not only enhanced preparation of the World Bank–financed project, but improved its implementation and positioned PGE for preparation of future projects. ASTAE's assistance enabled the World Bank to provide critical input to PGE's feasibility studies, environmental and social impact assessments, drilling strategies for its steam fields, and overall capacity building of the implementing agency. It provided the incremental support necessary to carry out the due diligence for the World Bank and CTF loans. The review and guidance provided to PGE on its power purchase agreements contributed to the ultimate agreement with the national power company on several geothermal developments, including the ones financed by the World Bank. And the review of safeguards work related to the impact of hydrogen sulfide has led to a national dialogue to address the issue on a sector-wide basis. Ultimately, ASTAE assistance to PGE will have a transformative impact by improving the prospects for success of the company's attempt to develop more than 1,000 MW of geothermal capacity, which will double Indonesia's capacity and account for a 10 percent increase in worldwide geothermal capacity.

Mongolia, Ulaanbaatar Clean Air Project

Ulaanbaatar, Mongolia's only international gateway, remains nearly unlivable during certain times in winter as the result of severe air pollution. Particulate matter (PM), which in its fine form is inhaled and causes major health damage, is severe. Among all measurements taken in a recent World Bank air pollution study, the worst recorded annual average concentration was more than 10 times higher than the Mongolian Air Quality Standard (AQS) for PM_{10} and 25 times higher than the Mongolian AQS for $PM_{2.5}$.

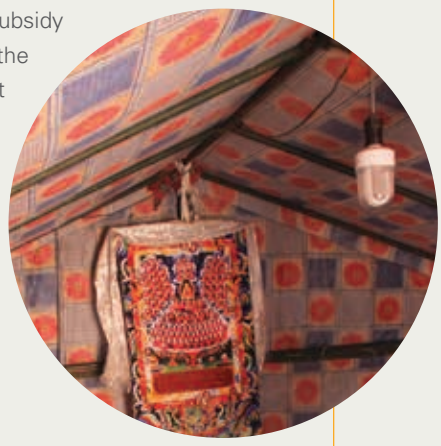
Air pollution in Ulaanbaatar is a manifestation of previous insufficient policy responses to a complex set of urban development issues exacerbated by an ever-growing peri-urban population. The influx of migrants over many years has resulted in the rapid expansion of mainly low-income ger areas, covering hillsides around the city and now accounting for 60 percent of the city's population. These migrants live in nomadic tents, called ger, which are self-built, poorly insulated, wood or brick detached houses.

The key contributors to ambient PM concentrations in winter are individual household coal-fired heating appliances (stoves and small furnaces); dust is a year-round contributor. These sources contribute about 62 percent of the estimated annual average ambient PM_{10} concentrations and 65 percent of the $PM_{2.5}$ concentrations. About 90 percent of an estimated 175,000 households use simple, coal-fired, low-cost steel stoves in their gers, or use stoves connected to heating walls.

The government and Ulaanbaatar have focused on practical, short-term measures, and donor resources have been mobilized; however, gaps remained. The objective of this US$21.9 million Bank project is to help plug the gaps of other existing initiatives by enabling consumers in ger areas to access heating appliances that produce fewer PM emissions, and to further develop selected medium-term PM abatement measures in Ulaanbaatar in coordination with development partners. The project includes the following components: (a) Ger Area Particulate Matter Mitigation; (b) Particulate Matter Mitigation in Central Ulaanbaatar; and (c) Public Awareness Raising, Program Coordination, and Project Management.

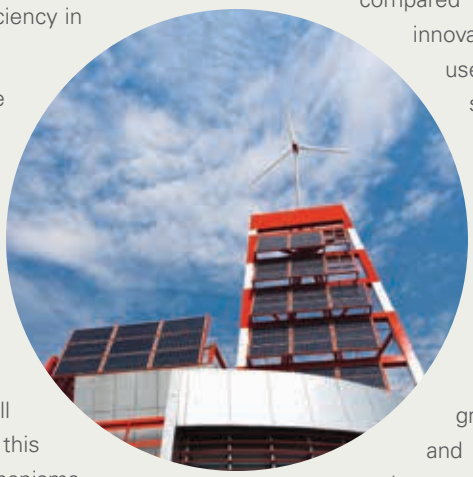
ASTAE contributed to the Bank project by financing the diagnostic of the situation through its report "Energy-Efficient and Cleaner Heating in Peri-urban Areas of Ulaanbaatar." The report highlighted the city's rapidly deteriorating air quality, and focused on the heating and cooking stoves used by ger residents as among the main culprits. The findings of the ASTAE-funded activity led to the conclusion that it is possible to develop a program aiming to provide cleaner, affordable heating to ger areas in Ulaanbaatar. The report outlined a program to replace stoves and introduce new fuels. It identified key actions such as setting technical standards and testing compliance with emissions targets, providing assistance to Mongolian stove producers and linking them up to international counterparts, as well as convincing households to switch to better fuel-stove combinations. It also recommended organizing a large-scale publicity and awareness campaign and putting a support mechanism in place to assist poor households in quickly adopting the measures to clean up the air they breathe.

Finally, it suggested using a subsidy voucher system based on the output-based aid approach that earlier showed promising results in Ulaanbaatar under a previous demonstration project.



China, Energy Efficiency Financing Project III (additional financing)

This large-scale China, Energy Efficiency Financing (CHEEF) project illustrates the long-term impact of just-in-time ASTAE financing. ASTAE provided technical assistance to kick-start an activity that is now so successful that it is in its third phase of additional financing. With the additional US$428 million, more than US$1 billion will have been leveraged to support energy efficiency in the industrial sector.



The government of China has made energy conservation one of the highest national priorities, and is aiming to reduce energy intensity by 16 percent during the 12th Five-Year Plan (2011–15). The government has also committed to reducing the carbon intensity of GDP by 40–45 percent from 2005 to 2020, and energy conservation will play an essential role in achieving this target. The use of market-based mechanisms to promote energy efficiency is expected to increase during the 12th Five-Year Plan. The State Council issued new policies to strongly support growth of the ESCO industry, offering subsidies, awards, and generous tax incentives for ESCOs, and encouraging bank lending to ESCOs by allowing banks to use and recognize ESCO project assets, contracts, and revenues as loan security. In addition, the government plans to expand the focus of its energy conservation efforts from the industry sector to the building and transport sectors, given that energy demand from buildings and transport will increase rapidly—tripling for buildings and more than quadrupling for the transport sector—during the next two decades.

The additional financing (also called CHEEF-III) supports the government's commitment to energy efficiency and endeavors to meet the huge needs for energy-efficiency investment in China. The expanded scope for the additional financing for CHEEF to scale up the project's impact and development effectiveness takes into account the government's new energy-efficiency policies and priorities, and lessons learned from CHEEF implementation so far, in particular the success of EXIM Bank in implementing the project. The additional financing is the most effective way of achieving the above objectives, especially when compared with a new free-standing project. The project includes the following improved or expanded features, compared with the original CHEEF: (a) piloting innovative ESCO lending, under which end users pay for ESCOs' energy-efficiency services from the demonstrated energy savings under performance-based contracts, and broadening the subborrowers from large and medium industrial enterprises to energy end users of all sizes and ESCOs; (b) expanding the target market segments from the industrial to the building sector, given the rapid growth in energy demand for buildings, and the government's plan to expand the range of priority energy conservation programs; and (c) increasing the leverage ratio of the IBRD loan to EXIM Bank's contribution from 1:1 in CHEEF to 1:2 in the additional financing.

ASTAE support consisted of helping determine the methodology and drafting an operations manual for IBRD loan on-lending to Chinese banks for energy-efficiency projects; determine eligibility criteria and initial selection of subprojects for financing; and preparation of procedures and support for appraisal, implementation, and general terms of subloans. ASTAE funding also helped develop the monitoring and reporting system in use in the CHEEF.

Pakistan, Natural Gas Efficiency Project

The availability of electricity and other energy is considered to be a main constraint to economic activity in Pakistan. The power sector faces a large gap between supply and demand, and load shedding is prevalent. Approximately 86 percent of Pakistan's population has access to electricity, but the quality and reliability of supply is poor. Natural gas is a vital source of energy supply in Pakistan; in FY10, Pakistan consumed about 1.5 trillion cubic feet of gas, all domestically produced and representing 49 percent of the country's total primary energy supply. However, many large gas fields are in decline, and at current production forecasts, the country is at or near its peak production. The Pakistan government's main goal in the energy sector is to increase the affordability and availability of energy, with a priority focus on electricity services and an associated focus on reducing dependence on costly oil imports.

Losses are more than 9 percent as compared with 1–2 percent in well-run gas networks. Indications from pilot projects are that at least 75 percent is methane leakage to the atmosphere; the other large component is gas theft. The project will bring the utility's gas losses (unaccounted-for gas) down to about 5 percent, thereby reducing methane emissions to the atmosphere and improving resource management, making natural gas more affordable, and improving service delivery.

ASTAE will provide assistance to the project management office of the subborrower (the gas utility) in the critical start-up phase of the project to ensure thorough analysis and discussion of organizational requirements for successful execution; to advise on strategic project execution matters, notably the segmentation of the network into smaller units; and to support pilot projects with energy-efficient consumer appliances, funded by IBRD/IDA but scaled up with GEF funds, which may help unleash further savings of gas resources and emissions. The project is seen as a remedy to some of the problems of the sector because it will cost-effectively make more natural gas available for economic use, including for thermal power plants, while at the same time reducing emissions of greenhouse gases.

Progress on 2012–15 Performance Indicators

In addition to reporting on its activity disbursements and reporting on World Bank–related investment projects (see appendix 4), ASTAE tracks a set of indicators showing the trajectory of its impact in supporting sustainable energy development.

The indicators were chosen to illustrate each pillar. Although they may not cover the pillar's entire spectrum—for example, there is more to renewable energy than generating electricity using renewable sources—the indicators convey the predominant trend. The indicators are usually available from World Bank project documentation and are therefore easily referenced from published sources. Appendix 2 provides a table linking all ASTAE activities disbursed in FY12 to the related World Bank projects, and shows their contributions to ASTAE indicators. A project's achievements are measured as direct when they result from World Bank loans and grants and as indirect when the impacts are derived from country stakeholder actions supported by World Bank and ASTAE technical assistance. Indirect impacts are tracked when relevant, but no pledge is made on these because little influence may be claimed by ASTAE.

Contributions from all projects approved during the business plan period are compiled to derive the indicators described below. Cumulative progress of all indicators against the business plan target is provided in table 3.5 at the end of this chapter.

Influence on Bank Lending

Indicator 1: Total World Bank lending catalyzed by ASTAE activities

As mentioned above, five ASTAE-supported projects were approved in FY12 by the Board for a total of US$1,301 million, most which were linked to activities undertaken in the 2007–11 business plan period.

Because FY12 disbursements are not a significant illustration of expected annual disbursements under the 2012–15 business plan period, no leverage ratio is calculated for this year. Under the 2007–11 business plan, on average, every dollar allocated by ASTAE leveraged US$223 in World Bank–related loans or grants to sustainable energy. The target for the 2012–15 business plan is a leverage ratio of 160, to leverage US$3,200 million with an ASTAE budget of US$20 million. The expected lower leverage ratio compared with the 2007–11 business plan is due to the decision to curtail ASTAE activities in China and India, where relatively larger leverage ratios could be achieved.

Renewable-Energy Pillar

The renewable-energy pillar is illustrated by a composite indicator measuring the contribution of ASTAE activities to the increasing use of renewable energy in client countries. Support to new renewable energy is expressed both in installed capacity, to reflect the actual investments made, and in actual energy generated annually, expressed in gigawatt-hours (GWh), to reflect the effective use of the installed capacity.

Indicator 2: New capacity and increased generation of renewable electricity

Table 3-1 provides the renewable electricity capacity and generation added during the first year of the fiscal 2012–15 business plan period, both directly through World Bank loans and indirectly from investments facilitated by World Bank projects and ASTAE activities. Countries listed in the table are those in which ASTAE supported renewable-energy activities in FY12, but not all activities have yet led to an approved project and progress on the related indicators.

TABLE 3-1:
RENEWABLE ELECTRICITY CAPACITY ADDED, BY COUNTRY, FISCAL 2012–15 BUSINESS PLAN PERIOD

COUNTRIES WITH ASTAE ACTIVITY IN RENEWABLE ENERGY	RENEWABLE ENERGY	
	CAPACITY (MW)	GENERATION (GWH)
BANGLADESH	N.A	N.A
INDONESIA	-	1,208
MALDIVES	N.A.	N.A.
MONGOLIA	-	-
NEPAL	N.A.	N.A.
PAPUA NEW GUINEA	N.A.	N.A.
TONGA	-	-
VIETNAM	N.A.	N.A.
TOTAL	**0**	**1,208**

N.A.: Not available yet, project to go to Board in subsequent years.
- : Not applicable—activity not expected to contribute to this indicator, or indicator not measurable.

The only renewable-energy-related project approved in FY12 was the geothermal project in Indonesia. Because the added capacity of 150 MW was already accounted for a bit prematurely in the 2007–11 business plan, it is not included this time to avoid double counting. However, the resulting generation had not been accounted for and is therefore included.

No progress was made on installed capacity this fiscal year but the 1,208 GWh that will be produced annually represents 40 percent of the target under the business plan. With renewable-energy-related activities that are likely to lead to projects going to the Board for approval in five countries in the next few years (listed as N.A. in the table), it is expected that the business plan target will be met.

Energy-Efficiency Pillar

The energy-efficiency pillar is evaluated by a composite indicator composed of the quantity of electricity saved, and the generation capacity avoided, by decreasing consumption, reducing waste, or both. It is a measure of the support to projects that limit the need for electricity generation throughout the year and limit the need for additional installed capacity to meet annual peak demand. Because this indicator focuses on electricity, it does not reflect ASTAE's work in heating, primarily space heating in northeast Asia, or in cookstove improvements. It does not capture the gains in either coal or oil saved when the efficiency activity targets industries rather than utilities. Despite these limitations, it is still considered a relevant marker for investments in energy efficiency.

TABLE 3-2:
CUMULATIVE ELECTRICITY SAVINGS, BY COUNTRY, FISCAL 2012–15 BUSINESS PLAN PERIOD

COUNTRIES WITH ASTAE ACTIVITY IN ENERGY EFFICIENCY	ENERGY EFFICIENCY (AVOIDED ELECTRICITY)	
	CAPACITY (MW EQUIVALENT)	GENERATION (GWH SAVED)
CHINA	-	-
MALDIVES	N.A.	N.A.
PAKISTAN	350	2,820
PAPUA NEW GUINEA	N.A.	N.A.
VIETNAM	-	-.
REGIONAL WORK	N.A.	N.A.
TOTAL	350	2,850

N.A.: Not available yet, project to go to Board in future years.
- : Not applicable—activity not expected to contribute to this indicator, or indicator not measurable.

Indicator 3: Electricity savings resulting from efficiency improvements

Table 3-2 provides a summary of cumulative annual electricity savings that derive from ASTAE-supported World Bank projects once fully implemented. These estimates are calculated based on direct savings through World Bank loans or on indirect support by way of investments facilitated by World Bank and ASTAE technical support.

As noted earlier, several energy-efficiency projects were approved in FY12 that were linked to ASTAE activities funded under the 2007–11 business plan period. These projects did not measure energy-efficiency savings in electricity-equivalent metrics, so they did not contribute formally to the indicator. However, the annual savings remain significant, with China saving 0.59 million tons of coal equivalent and Vietnam 0.36 million tons of oil equivalent through support to efficiency in the industrial sector.

The main contributor to energy-efficiency indicators is the Pakistan gas loss reduction activity that, once operational, will save 22 billion cubic feet of gas annually, or the equivalent 2,820 GWh, the generation of a 350 MW plant at a 92 percent power generation factor. This avoided equivalent loss is significant, representing 141 percent of the generation equivalent target for the entire business plan period.

Access to Modern Energy Services Pillar

The access to energy pillar is measured by the number of households that received new or improved connections to modern energy services. Because the services provided by an improved wood-burning stove that reduces smoke emissions and decreases consumption of raw wood for the same heat output is not equivalent to the services of an improved electricity connection or even of new access to electricity, these three types of access are now separated.

New connections to electricity have life-changing impacts, whether because of new opportunities opened by access to electricity or improved efficiency in daily tasks made possible by the use of powered tools and appliances.

Improved connections help remove constraints on households, often by lowering the amount of fuel needed or by improving the reliability of existing services, thereby eliminating the need for backup service. For example, improved electricity connections in Vietnam helped reduce the need for alternative sources of lighting, such as kerosene lamps or candles that were used when unplanned blackouts were a frequent occurrence.

It should be noted, however, that the distinction between new and improved services is not always as obvious as it might appear. A new connection is often, in fact, an improved connection to the same service but using a more efficient fuel source. For example, a new connection to electricity displaces the use of kerosene for lighting or batteries for radios, and provides a much more efficient and less costly source, but does not bring new lighting services or radio use because these were already in place.

TABLE 3-3:
HOUSEHOLDS WITH ACCESS TO MODERN ENERGY SERVICES, BY COUNTRY, 2012–15 BUSINESS PLAN PERIOD

COUNTRIES WITH ASTAE ACTIVITY IN ACCESS TO ENERGY	HOUSEHOLDS WITH NEW OR IMPROVED ACCESS TO MODERN ENERGY SERVICES (NUMBER OF HOUSEHOLDS)		
	NEW ELECTRICITY ACCESS	IMPROVED ELECTRICITY ACCESS	IMPROVED COOKING AND HEATING ACCESS
BANGLADESH	N.A.	N.A.	N.A.
INDONESIA	N.A.	N.A.	N.A.
MONGOLIA	-	-.	175,000
REGIONAL PROJECTS	-	-	-.
TOTAL	0	0	175,000

N.A.: Not available yet, project to go to Board in future years.
- : Not applicable—activity not expected to contribute to this indicator, or indicator not measurable.

Indicator 4: Households with access to modern energy services

This indicator comprises three sub-indicators: (a) the number of households receiving new access to electricity, (b) the number of households receiving improved electricity, (c) the number of households receiving improved access to efficient stoves for heating and cooking.

Table 3-3 shows that although several activities involve access, the only project that came to the Board in FY12 was a heating project in Mongolia. Although very important at the country level, the relatively small population of Mongolia resulted in very little progress toward this target, at a mere 3 percent.

The regional activities—supporting strategy-making and sharing lessons learned—are not expected to contribute directly to the indicators. However, several access activities in the pipeline in Bangladesh and Indonesia are expected to yield significant progress in the coming years.

Cross-Cutting Indicators

A fifth and a sixth indicator that cut across the three pillars also have been defined. One is dependent on the results from the three pillars' individual indicators, whereas the other is a more general assessment of ASTAE's involvement across the region.

The fifth indicator measures reductions in CO_2 emissions, representing the overall impact on greenhouse gas abatement. It is an important metric because CO_2 emissions are considered the main contributor to the greenhouse effect. ASTAE activities have a direct impact on CO_2 reduction through World Bank project contributions to renewable energy, energy efficiency, and improved access to modern energy services.

The sixth indicator ensures that financial assistance is provided to all countries in the region and avoids the unintended trap of focusing on large countries just to meet the previous four indicators.

Indicator 5: Avoided greenhouse gas emissions

This indicator estimates the quantity of CO_2 emissions that would be avoided over 20 years (the conventional lifespan of projects or equipment) through ASTAE-supported World Bank projects. It determines the CO_2 equivalent saved directly and indirectly through the replacement of conventional thermal power plants with renewable energy and realizing the potential energy savings.

TABLE 3-4:
CO_2 MITIGATED, BY COUNTRY, 2012–15 BUSINESS PLAN PERIOD

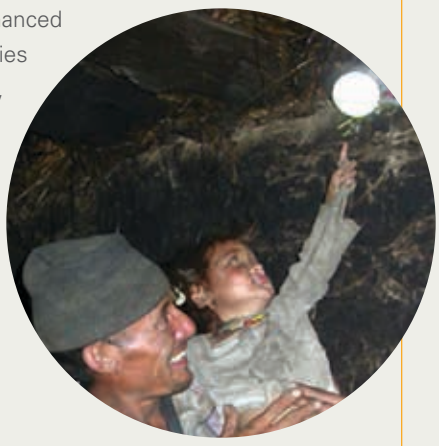
COUNTRIES WITH ASTAE ACTIVITY THAT MAY REDUCE GHG	CO_2 MITIGATED (MILLION TONS OVER 20 YEARS)
BANGLADESH	N.A.
CHINA	28.8
INDONESIA	-
MALDIVES	N.A.
MONGOLIA	N.A.
NEPAL	N.A.
PAKISTAN	240.0
PAPUA NEW GUINEA	N.A.
TONGA	N.A.
VIETNAM	8.3
REGIONAL PROJECTS	N.A.
TOTAL	277.1

N.A.: Not available yet, project to go to Board in future years.
- : Not applicable—activity not expected to contribute to this indicator, or indicator not measurable.

Table 3-4 confirms that to scale up CO_2 emissions mitigation substantially, support to country programs that focus on wasteful energy use in energy-intensive economic sectors has the greatest effect. Here, the highest impact was achieved by a project in a single country, Pakistan, where reducing leakage in methane-intensive natural gas led to meeting the entire business plan target in one year—a rather atypical result.

Indicator 6: Countries benefiting from ASTAE support

This indicator ensures that ASTAE resources are used in a balanced manner across all ASTAE countries, providing equal funding opportunities to large countries (for example, Pakistan, Indonesia, and Vietnam) and to smaller countries (such as Pacific Islands and Maldives). ASTAE financed activities in 9 countries out of the 15 targeted, in addition to regional activities. With four countries in South Asia and five in East Asia, the progress was roughly equal across the two regions



Summary of Progress on Indicators Against Business Plan Targets

All ASTAE activities are designed to adapt to the wide variety of issues throughout the region, as well as to the country context. Table 3-5 provides a summary of all indicators discussed in this chapter.

TABLE 3-5:
SUMMARY OF FISCAL 2012–15 BUSINESS PLAN TARGETS PLEDGED AND ACHIEVED

DIRECT INDICATORS	UNIT	VALUE PLEDGED	VALUE ACHIEVED	PROGRESS %
1. TOTAL WORLD BANK LENDING CATALYZED BY ASTAE ACTIVITIES				
PROJECTS AND PROGRAM LENDING	MILLION US$	3,200	1,301	40
2. NEW CAPACITY AND INCREASED GENERATION OF RENEWABLE ELECTRICITY				
RENEWABLE ENERGY - CAPACITY	MW	1,500	0	0
RENEWABLE ENERGY - GENERATION	GWH/YEAR	3,000	1,208	40
3. ELECTRICITY SAVINGS RESULTING FROM EFFICIENCY IMPROVEMENTS				
ENERGY SAVINGS - CAPACITY	MW EQVT	1,000	350	35
ENERGY SAVINGS - GENERATION	GWH/YEAR	2,000	2,820	141
4. HOUSEHOLDS WITH ACCESS TO MODERN ENERGY SERVICES				
ACCESS TO ELECTRICITY (NEW)	HOUSE-HOLD	2,000,000	0	-
ACCESS TO ELECTRICITY (IMPROVED)	HOUSE-HOLD	1,000,000	0	-
IMPROVED STOVES FOR HEATING (COOKING AND SPACE)	HOUSE-HOLD	5,000,000	175,000	3
5. AVOIDED GREENHOUSE GAS EMISSIONS				
DIRECT CO_2 AVOIDED OVER 20 YEARS	MILLION TONS	200	277	138
6. COUNTRIES BENEFITING FROM ASTAE SUPPORT				
NUMBER OF COUNTRIES	COUNTRIES	15	9	60

Note: Direct refers to values achieved, or expected to be achieved, in the course of World Bank–funded projects that benefited from ASTAE support.

4

Outlook for FY13 AND BEYOND

ASTAE Business Plan for Fiscal 2012–15

The challenges ahead for ASTAE, based on experience and the characteristics of the region, are numerous:

- Both the South Asia region (SAR) and the East Asia and Pacific region (EAP) comprise countries with widely varying levels of economic development, geographic size and remoteness, resource endowments, and cultures.
- Urbanization in the more advanced economies in the region has been occurring much more rapidly than expansion of basic infrastructure. A number of these urbanizing areas require solutions similar to those being undertaken in developed economies, such as low-carbon growth, economically and ecologically sustainable cities, smart grids, and the like.
- Conversely, the less advanced economies suffer from very low levels of access to basic infrastructure, limited capacity to develop and implement even simple projects, and nonexistent master plans and strategies. For some, the small size of their economies and their remoteness and isolation underpin these issues.
- Common to many countries in the region, however, is low access to clean, modern energy, compounded by weak governance, including legal, institutional, and regulatory frameworks.
- Finally, both SAR and EAP are vulnerable to climate change and other environmental impacts.

These challenges make it ever more important for ASTAE to continue to focus on its three existing pillars, to more vigorously promote green growth, and to devote greater attention to regional and cross-sectoral cooperation, both physically and through the sharing of knowledge and experience.

ASTAE is well positioned to tackle these challenges and opportunities based on its track record of success since its establishment in 1992, as evidenced by the achievement of targets set in previous business plans, favorable reviews by external experts from the Bank, and ASTAE's impact on EAP's, SAR's, and the Bank's portfolios. Through its focus on energy, ASTAE can play a crucial role in promoting low-carbon, green growth—an emerging worldwide trend, especially in Asia. ASTAE has a significant advantage in promoting regional cooperation to scale up a range of sustainable energy practices from one country to the regional level.

ASTAE engages with client countries from the very early stages of decision making to ensure that investment projects presented to the World Bank Executive Board for approval will promote sustainable development and poverty reduction. For example, ASTAE's technical assistance contributes to the high quality of client-prepared feasibility studies so that the Bank can better prepare and appraise projects for Board approval. ASTAE's technical assistance to client countries at the earlier stages not only helps to identify issues and sustainable energy solutions (potential investment projects), but also can identify and mobilize potential funding sources.

Goal and Objective

Consistent with past business plans, ASTAE's enduring goal is to contribute to poverty reduction and protection of the environment, as made operational through its unchanged objective, to "scale up the use of sustainable energy options in Asia to reduce energy poverty and protect the environment." ASTAE defines sustainable energy as energy security, sustainable sources of energy, continuous and reliable flows of energy supply, and financially sustainable energy for suppliers and users.

Sustainable energy options remain as defined through the three ASTAE pillars:

- Energy efficiency
- Renewable energy
- Access to modern energy services

ASTAE operational support is implemented through four key approaches:

- Supporting innovative financing and delivery mechanisms,
- Enhancing policy and regulatory frameworks
- Building capacity and sharing knowledge
- Promoting cross-sectoral and regional collaboration for mitigation of, and adaptation to, climate change

Articulation of the fourth approach is new, although ASTAE has been implementing this approach for some time. It has been added to emphasize ASTAE's increasing commitment to this approach.

Specific Objectives of the Third Phase of ASTAE

As noted, ASTAE's specific objective in its early days was to mainstream alternative energy in lending and grants in EAP. The objective of ASTAE's second phase was to scale up, mainly on a country basis. In this third phase, the specific objective is to promote low-carbon, green growth,[2] and to scale up supply of and access to sustainable energy on a regional basis. ASTAE will devote special attention to supporting the promotion of sustainable energy as part of a region-wide system to create synergistic impacts and promote increased efficiency. The increasing importance of the regional dimensions of ASTAE's mission is reflective of external demand and opportunities and ASTAE's long-standing experience and capabilities.

Low-carbon, green growth

Promoting low-carbon, green growth calls for cross-sectoral work. First among the priority activities is ecologically and economically sustainable cities, which will require integrated land-use planning, transport, building, other infrastructure services, and urban agriculture. Rural development will remain an area of focus, and will include creating synergies between renewable energy, food security, and water management.

Scaling up supply of and access to sustainable energy on a regional basis

ASTAE's intra- and interregional activities will continue to address specific issues that are best handled at the supranational level. In addition to supporting regional projects as defined under International Development Association (IDA) guidelines,[3] ASTAE will encourage South-South cooperation and knowledge sharing, and continue to support the regional, cross-border, and common (or similar) challenges faced by countries in the region. Past ASTAE-supported activities with regional dimensions generally followed four concepts:

- First are regional products, methodologies, and instructional frameworks shared by countries in the region. Examples include the popular EAP region's wind atlas, the carbon-emission-mitigation toolkit for road construction, and the institutional framework for efficient urban transportation.
- Second is replication of specific activities and concepts in neighboring countries. For example, both the cookstove program and the biodigestor program developed in Cambodia were replicated in Laos PDR, with specific adaptations built on local Lao traditions.
- Third are training and study tours to neighboring countries as a component of World Bank lending and grant investment activities. These activities have been crucial for capacity building in client countries and South-South learning, as well as for North-South learning. In addition to study tours, regional conferences to share lessons learned and exchange knowledge have been held, showcasing experiences from Bank investment activities and sometimes leading to future Bank investment activities.

[2] Based on a review of literature from middle- and high-income countries, green growth is defined as sustainable development and growth in harmony with protection of the environment and ecosystem. Protection of the environment and ecosystem is an engine of growth and development rather than an obstacle. Green growth has the following characteristics:

- Sustains economic growth
- Reduces environmental damage, including local pollution and greenhouse gas emissions
- Minimizes waste and inefficient use of natural resources
- Relies on energy-efficient and low-carbon energy resources and production technologies
- Builds sustainable infrastructure, such as compact urban form and public transport
- Promotes green technologies and creates new job opportunities
- Educates and increases the awareness of citizens to adopt resource-efficient consumption patterns.

Green, low-carbon growth not only improves environmental sustainability, but brings additional benefits for development, such as enhanced energy security, less traffic congestion, more livable cities, and greater competitiveness from higher productivity, thus justifying part of its cost and increasing the appeal of green policies.

[3] Under IDA15 guidelines, regional projects are operations (a) that involve three or more countries, all of which need to participate for the project's objectives to be achievable; (b) whose benefits, either economic or social, spill over country boundaries; (c) for which there is clear evidence of country or regional ownership that demonstrates commitment of the majority of participating countries; and (d) that provide a platform for a high level of policy harmonization between countries, and importantly, that are part of a well-developed and broadly supported regional strategy. Starting with IDA16, the three-country requirement for regional projects was relaxed to allow two countries, of which at least one is a fragile or conflict-affected country, to be eligible for financing for regional IDA projects. The three-country criterion is retained for all other IDA countries.

- Fourth is the production of regional strategic studies that guide future World Bank investments. Among these studies are the EAP strategic flagship reports entitled *Winds of Change: East Asia's Sustainable Energy Future* to promote low-carbon, green growth, and *One Goal, Two Paths: Achieving Universal Access to Modern Energy in East Asia and the Pacific* to promote energy access in future Bank investments in the region.

Strategy and Budget

ASTAE seeks to continue its successful work in EAP while reengaging in SAR. Consistent with its downstream project- and program-oriented focus, ASTAE will add recipient-executed trust fund activities to the current Bank-executed trust fund activities. Intervention at the national level will remain the core intent, but specific attention will be paid to opportunities to scale up country practices to regional status. At the same time, given the growth and importance of cities and urbanization, ASTAE will also provide support at the subnational level. It will continue to seek cross-sectoral synergies whenever relevant to the ASTAE pillars, especially when they fit well with the cross-sectoral dimensions of low-carbon, green growth.

The estimated budget required to intensify the work in EAP, to extend ASTAE activities into SAR, and to support recipient-executed activities is at least US$20 million over the next four fiscal years. ASTAE will allocate operational budget resources to intensify downstream activities related to sustainable energy projects and programs as shown in table 4-1.

IDA and non-IDA countries are likely to receive comparable budget allocations. The IDA countries are more numerous, but have smaller economies, thus requiring fewer resources per country. The non-IDA countries generally have larger economies and will require concomitantly higher proportional resources.

TABLE 4-1:
INDICATIVE OPERATIONAL BUDGET ALLOCATION

IDA COUNTRIES	40 PERCENT
MIDDLE-INCOME COUNTRIES	30 PERCENT
REGIONAL WORK AND KNOWLEDGE-SHARING ACTIVITIES	20 PERCENT
SELECTIVE ENGAGEMENT WITH INDIA AND CHINA	10 PERCENT

The target allocation per pillar is 50 percent for renewable energy, 25 percent for energy efficiency, and 25 percent for access to energy. Cross-sectoral and regional activities, including green growth; climate change; and poverty, gender, and other social and environmental issues overlap among the three pillars (table 4-2).

TABLE 4-2:
INDICATIVE OPERATIONAL BUDGET ALLOCATION BY ASTAE PILLAR

RENEWABLE ENERGY	50 PERCENT
ENERGY EFFICIENCY	25 PERCENT
ENERGY ACCESS	25 PERCENT

Table 4-3 summarizes indicators ASTAE pledges to achieve for the fiscal 2012–15 business plan period, based on lessons learned. Formal indicators are built on the basis of approved projects presented to the Bank's Board of Executive Directors during the business plan period. Only sustainable energy projects that benefit from ASTAE funding will be counted toward the pledged indicators. Additional indicators on possible cross-sectoral impacts may be considered.

TABLE 4-3:
SUMMARY OF PLEDGED INDICATORS FOR BUSINESS PLAN FISCAL 2012–15

DIRECT INDICATORS	UNIT	VALUE PLEDGED
1. TOTAL WORLD BANK LENDING CATALYZED BY ASTAE ACTIVITIES		
PROJECTS AND PROGRAM LENDING	MILLION US$	3,200
2. NEW CAPACITY AND INCREASED GENERATION OF RENEWABLE ELECTRICITY		
RENEWABLE ENERGY, CAPACITY	MW	1,500
RENEWABLE ENERGY, GENERATION	GWH/YEAR	3,000
3. ELECTRICITY SAVINGS RESULTING FROM EFFICIENCY IMPROVEMENTS		
ENERGY SAVINGS, CAPACITY	MW	1,000
ENERGY SAVINGS, GENERATION	GWH/YEAR	2,000
4. HOUSEHOLDS WITH ACCESS TO MODERN ENERGY SERVICES		
ACCESS TO ELECTRICITY (NEW)	HOUSEHOLD	2,000,000
ACCESS TO ELECTRICITY (IMPROVED)	HOUSEHOLD	1,000,000
IMPROVED STOVES FOR HEATING (COOKING AND SPACE)	HOUSEHOLD	5,000,000
5. AVOIDED GREENHOUSE GAS EMISSIONS		
DIRECT CO_2 AVOIDED OVER 20 YEARS	MILLION TONS	200
6. COUNTRIES BENEFITING FROM ASTAE SUPPORT		
NUMBER OF COUNTRIES	COUNTRIES	15

Note: Direct refers to values achieved, or expected to be achieved, in the course of World Bank–funded projects benefiting from ASTAE support.

Appendixes

Appendix 1: ASTAE Countries at a Glance: Region Map and Pillar-Related Statistics

The map in appendix figure 1-1shows the partner countries where ASTAE operates in the South Asia (SAR) and East Asia and Pacific (EAP) Regions. In this map, SAR includes all countries to the west of Myanmar, while the other countries, including Myanmar itself, are in the EAP region.

Appendix Figure 1-1: ASTAE Presence in the South Asia and the East Asia and Pacific Regions

Appendix table 1-1 provides data to illustrate the diversity of SAR and EAP countries in the context of ASTAE pillars.
These data are not updated regularly by any centralized entity, and some are not available for the most recent years. They are primarily sourced from the U.S. Department of Energy's Energy Information Administration (EIA), internal World Bank data, and the International Energy Agency (IEA). Although the best comparisons could be made if all data were for the same year, data for the most current year are provided whenever possible. The footnotes to the table provide further details.

APPENDIX TABLE 1-1: BACKGROUND DATA PROVIDING CONTEXT TO ASTAE PILLARS

Region and Countries of Activity	BasicContext		First Pillar: Renewable Energy				Second Pillar: Energy Efficiency		Third Pillar: Access		Greenhouse Gas Emissions			
	Population (EIA 2010)	GDP (WB 2010)	Installed capacity, electricity (EIA 2008)	Annual electricity generation (EIA 2008)	Installed capacity, renewable (EIA 2008)	Share of generation using renewable (EIA 2008)	Energy intensity in the economy (EIA 2008)	Energy Intensity in power production (EIA 2008)	Population without electricity (WB 2010)	Electrification rate (World Bank, IEA 2010)	Annual energy-related CO_2 emissions and ranking (EIA 2009)		Annual per capita energy related CO_2 emissions and ranking (EIA 2009)	
	Million	Billion US$	MW	TWh	MW	%	tCO_2 / US$1,000 GDP	tCO_2 / MWh	Million	%	Million ton	Out of 189	ton / capita	Out of 189
EAST ASIA AND PACIFIC														
Cambodia	14.7	11.2	386	1.4	18	4	0.48	1.150	11.2	24	4	132	0.28	165
China	1,330.1	5,926.6	797,078	3,221.2	186,820	17	2.21	0.760	13.3	99	7,707	1	5.82	59
Indonesia	228.2	706.6	27,802	141.2	5,801	14	1.16	0.730	79.9	65	415	16	1.73	116
Lao PDR	6.4	7.3	723	4.0	673	92	0.32	—	1.9	70	1	164	0.20	172
Mongolia	3.1	6.2	832	3.9	0	0	2.46	0.540	0.3	90	7	107	2.43	104
Papua New Guinea	6.4	9.5	699	3.0	271	30	0.81	—	6.0	13	5	122	0.82	139
Philippines	99.8	199.6	15,680	57.4	5,283	34	0.68	0.460	16.0	84	72	45	0.74	144
Thailand	67.4	318.5	40,669	139.0	3,487	8	1.27	0.530	0.7	99	254	25	3.82	79
Vietnam	89.6	106.4	13,850	70.0	5,500	37	1.41	0.430	3.6	96	98	39	1.11	129
SOUTH ASIA														
Afghanistan	29.1	17.1	489	0.8	—	—	0.08	—	25.3	13	1	171	0.03	189
Bangladesh	156.1	100.2	5,453	32.9	230	4	0.75	0.570	79.6	49	55	55	0.36	158
Bhutan	0.7	1.5	1,505	7.1	1,498	99	0.35	—	0.3	56	—	—	0.48	153
India	1,173.1	1,727.1	177,376	785.5	51,363	50	1.40	0.950	398.9	66	1,591	3	1.38	123
Nepal	29.0	12.0	717	3.1	660	99	0.35	0.030	16.5	43	3	134	0.12	179
Pakistan	184.4	176.9	19,769	87.7	6,464	31	1.08	0.430	70.1	62	140	33	0.77	141
Sri Lanka	21.5	49.6	2,645	8.9	1,360	46	0.45	0.380	4.9	77	13	92	0.59	149
SMALL ISLAND COUNTRIES														
Fiji	0.9	3.5	216	0.9	95	71	0.74	—	0.2	75	2	144	2.56	99
Maldives	0.4	1.9	106	0.3	—	—	0.94	—	—	99	1	169	2.32	104

Region and Countries of Activity	BasicContext		First Pillar: Renewable Energy				Second Pillar: Energy Efficiency		Third Pillar: Access		Greenhouse Gas Emissions			
	Population (EIA 2010)	GDP (WB 2010)	Installed capacity, electricity (EIA 2008)	Annual electricity generation (EIA 2008)	Installed capacity, renewable (EIA 2008)	Share of generation using renewable (EIA 2008)	Energy intensity in the economy (EIA 2008)	Energy Intensity in power production (EIA 2008)	Population without electricity (WB 2010)	Electrification rate (World Bank, IEA 2010)	Annual energy-related CO_2 emissions and ranking (EIA 2009)		Annual per capita energy related CO_2 emissions and ranking (EIA 2009)	
	Million	Billion US$	MW	TWh	MW	%	tCO_2 / US$1,000 GDP	tCO_2 / MWh	Million	%	Million ton	Out of 189	ton / capita	Out of 189
SMALL ISLAND COUNTRIES (CONT.)														
Solomon Islands	0.6	0.7	14	0.1	0	0	0.55	—	0.5	18	—	—	0.53	150
Samoa	0.2	0.6	41	0.1	12	46	0.36	—	—	97	—	—	0.77	142
Timor-Leste	1.2	0.7	—	—	—	—	0.98	—	0.9	22	—	—	0.27	157
Vanuatu	0.2	0.7	12	0.0	0	0	0.28	—	0.1	27	—	—	0.53	149
WORLD INDEX														
World	6,853.0	63,123.0	4,624,767	19,103.2	1,056,413	19	0.61	0.510	1,302.1	81	30,313	—	4.47	Equiv. 69
DEVELOPING ASIA SHARE OF TOTAL														
Developing Asia share (%)	50.2%	14.9%	23.9%	23.9%	25.5%	—	—	—	56.1%	—	34.2%	—	—	—
EAP share (%)	27.0%	11.6%	19.4%	19.1%	19.7%	—	—	—	10.3%	—	28.3%	—	—	—
SAR share (%)	23.3%	3.3%	4.5%	4.8%	5.8%	—	—	—	45.7%	—	6.0%	—	—	—

SOURCES:
- *GDP: WORLD BANK 2010 (CURRENT US$).*
- *ELECTRIFICATION RATE: WORLD BANK AND IEA DATA 2010.*
- *CO_2 EMISSIONS: EIA 2009.*
- *RANKING OF CO_2 EMISSIONS: ASTAE, USING EIA 2009 DATA.*
- *ALL OTHER INDICATORS: EIA 2009 (OR 2008 WHEN 2009 NOT AVAILABLE).*
- *ASIA SHARE OF TOTAL: ASTAE CALCULATIONS USING ALL ABOVE-MENTIONED SOURCES.*

NOTE: —DATA NOT AVAILABLE.

Appendix 2: Link between ASTAE Activities, Bank Projects, and ASTAE Indicators for Fiscal 2012–15

Appendix table 2-1 links the ASTAE activities and the World Bank projects that contributed to the global ASTAE indicators in the fiscal 2012–15 business plan period as discussed in chapter 3.

APPENDIX TABLE 2-1: LINK BETWEEN ASTAE ACTIVITIES, BANK PROJECTS, AND ASTAE FISCAL 2012–15 INDICATORS, AS OF FY12

ASTAE Activity (fiscal year when active)	**World Bank Project** (fiscal year approved)	Indicators					
		Investment leverage	Renewable-energy pillar	Energy efficiency pillar	Access pillar	CO_2 mitigation	Source of indicator
CHINA							
Energy Efficiency Financing Promotion (FY09 and FY11) • Draft an operations manual for IBRD loan on-lending to Chinese banks for energy-efficiency projects • Determine eligibility of subprojects for financing, preparation procedures and appraisal, implementation, and general terms of subloans • Develop the monitoring and reporting system	**Energy Efficiency Financing III Project – Additional Financing** (FY12)	US$428 million	-	0.59 million tons of coal equivalent annually	-	28.8 million tons over 20 years	World Bank Project Appraisal Document -Annex 1-Result Framework
INDONESIA							
Geothermal Power Support Program (FY08–11) • Assist in review, design, and consensus building for policy reforms in the geothermal sector • Enhance government's capacity to integrate Clean Development Mechanism in geothermal development • Assist in identifying and preparing geothermal projects to be financed by World Bank loan	**Geothermal Clean Energy Investment Project** (FY12)	US$574.7 million Note: Not yet counted, allocated to fiscal 12–15 business plan	150 MW and 1,208 GWh/y Note: MW already counted under fiscal 2007–11 business plan, but not GWh	-	-	22 million tons over 20 years (direct) Note: Already counted under fiscal 2007–11 business plan	World Bank Project Appraisal Document -Annex 1-Result Framework
MONGOLIA							
Heating in Poor, Peri-Urban Areas of Ulaanbaatar (FY08–09) • Technical assistance to the government to analyze the sources of air pollution, provide information on how to mitigate through cleaner stoves, and provide suggestions for an intervention strategy • The ASTAE-published report was instrumental in gaining government and stakeholder acceptance of diagnostic and recommendations.	**Ulaanbaatar Clean Air Project** (FY12)	US$21.94 million	-	-	175,000 households with improved heating solutions	-	World Bank Project Appraisal Document- Annex 1-Result Framework

ASTAE Activity (fiscal year when active)	World Bank Project (fiscal year approved)	Indicators					
		IInvestment leverage	Renewable-energy pillar	Energy efficiency pillar	Access pillar	CO_2 mitigation	Source of indicator
PAKISTAN							
Natural Gas Loss Reduction (FY12) • Assistance to the gas utility in the start-up phase to ensure proper analysis and discussions on organizational requirements for successful execution • Advise on strategic execution matters and notably the segmentation of the network into smaller units • Provide support to pilot projects with energy-efficient consumer appliances	**Natural Gas Efficiency Project** (FY12)	US$272 million	-	22.2 billion cubic feet/ year (equivalent to what would be needed for a 350 MW plant to produce 2,820 GWh/y at 92% factor)		240 million tons due to the extreme GHG potency of methane over 20 years	Calculated by Task Team Leader from World Bank Project Appraisal Document-Annex 1-Result Framework
VIETNAM							
Support for the Energy Efficiency Demand-Side Management Program (FY10–11) • Advisory assistance and capacity building to Ministry of Industry • Workshops on business collaboration between Vietnamese and international energy services companies • Identify opportunities for expansion of commercial energy-efficiency business	**Clean Production and Energy Efficiency Project** (FY12)	US$4.15 million	-	0.36 million tons of oil equivalent per year	-	8.3 million tons over 20 years	World Bank Project Appraisal Document – Annex 1-Result Framework

NOTE: - = NOT APPLICABLE.

Appendix 3: ASTAE Donors, Resource Use, and Funding Events

ASTAE Donors

ASTAE currently relies on the Netherlands and Sweden as donor countries for its budget, as well as on matching funds from the World Bank (see the section "ASTAE Resource Use" below). Previous ASTAE donors include Australia, Canada, Finland, Japan, Switzerland, the United Kingdom, and the United States. The United Kingdom joined anew as an ASTAE donor in FY13

The Netherlands: Ministry of Foreign Affairs (Development Cooperation)

ASTAE's principal funding source is currently the Netherlands, through its Ministry of Foreign Affairs (Development Cooperation). The Netherlands is a founding donor as well as a core ASTAE donor, and since 1993 has contributed reliably to ASTAE's capacity to engage in sustained activities. The funding agreement for the 2012–15 business plan period was signed in 2011 for US$12 million.

The website for the Ministry of Foreign Affairs is http://www.minbuza.nl/en.

Sweden: Swedish International Development Agency

Sweden joined ASTAE donors in 2007 and since then has been a regular and welcome contributor to ASTAE. The funding agreement for the 2012–15 business plan period was signed in 2011with the Bangkok office in charge of Asia for the equivalent of US$6 million.

The website for the Swedish International Development Agency is http://www.sida.se/English/.

ASTAE Resource Use

ASTAE used donor funds totaling US$960,043 in FY12. Complementary World Bank resources for ASTAE-supported projects totaled US$1,034,339 in FY12.

ASTAE has used US$35.3 million in donor funds since 1992, an amount matched by the World Bank with US$33.2 million during the same period. Details of resource use by year are in appendix table 3-1.

APPENDIX TABLE 3-1: RESOURCE USE, WORLD BANK AND DONORS, FY1992–2011

	DONORS		WORLD BANK		TOTAL	
YEAR	US$	%	US$	%	US$	%
FY92	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	3,214,576	100
FY03	2,205,111	64	1,239,633	36	3,444,744	100
FY04	1,014,358	25	3,013,893	75	4,028,251	100
FY05	2,704,306	44	3,450,703	56	6,155,009	100
FY06	1,959,983	38	3,169,070	62	5,129,053	100
FY07	1,216,589	30	2,827,968	70	4,044,557	100
FY08	1,847,757	45	2,258,369	55	4,106,126	100
FY09	2,177,200	53	1,915,042	47	4,092,242	100
FY10	2,123,893	54	1,820,321	46	3,944,214	100
FY11	2,603,947	67	1,301,789	33	3,905,736	100
FY12	960,043	48	1,034,339	52	1,994,382	100
TOTAL	**35,311,502**	**52**	**33,245,882**	**48**	**68,557,384**	**100**

APPENDIX TABLE 3-2: PRINCIPAL ASTAE FUNDING EVENTS SINCE 2004

YEAR	MONTH	DONOR	EVENT	AMOUNT (US$)
2004	March		ASTAE Donors Meeting #13	
	March	United Kingdom	DFID Tranche #6	363,351
	March	Canada	CIDA Tranche #2	563,562
	May	Netherlands	Commitment ASTAE Phase 3 Funding 2004–06 (€ 3.3 million)	
	October	Canada	CIDA Tranche #3	591,871
2005	January	Netherlands	Dutch Partnership Trust Fund Phase 3 Tranche #1	1,454,500
	February	Canada	CIDA Tranche #4	202,544
	March		ASTAE Donors Meeting #14	
	May	Netherlands	Commitment for ASTAE II Funding 2006–08	
2006	March		ASTAE Donors Meeting #15	
	May	Netherlands	BNPP Agreement signed for ASTAE II, 2006–09	
	July	Netherlands	BNPP Tranche #1, ASTAE II	2,598,540
2007	March	Germany	ASTAE Donors Meeting #16	
		Sweden	Commitment by Swedish International Development Agency (SKr 15 million; equivalent to US$2,355,00)	
	December	Netherlands	BNPP Tranche #2 - ASTAE II	1,113,660
2008	February	United States	ASTAE Donors Meeting #17	
	February	Sweden	First Tranche of Sida Commitment	553,435
	June	Netherlands	BNPP Tranche #3 - ASTAE II	1,856,069
2009	April	United States	ASTAE Donors Meeting #18	
	February	Sweden	Second Tranche of Sida Commitment	436,620
	June	Netherlands	BNPP Tranche #4 - ASTAE II	1,856,069
2010	April	United States	ASTAE Donors Meeting #19	
	January	Sweden	Third Tranche of Sida Commitment	389,414
	June	Sweden	Fourth Tranche of Sida Commitment	489,256
	December	Netherlands	ASTAE-II Trust Fund closing	
2011	February	Sweden	ASTAE Sida Trust Fund closing	
	February	World Bank	ASTAE Multidonor Trust Fund (MDTF) created	
	March	United States	ASTAE Donors Meeting #20	
	March	Netherlands	Ministry of Foreign Affairs commitment to MDTF for $12 million	
	April	Netherlands	ASTAE-II Trust Fund end of disbursements	
	June	Sweden	ASTAE Sida Trust Fund end of disbursements	
	July	World Bank	ASTAE MDTF Effective	
	August	Netherlands	Netherlands Tranche #1	8,000,000
	December	Sweden	Sida Commitment for SKr 40 million	
	December	Sweden	Sida Tranche #1	2,905,625
2012	May	United States	ASTAE Donors Meeting #21	

Note: BNPP = Bank-Netherlands Partnership Program; CIDA = Canada International Development Agency; DFID = U.K. Department for International Development; MDTF = multidonor trust fund; Sida = Swedish International Development Agency; SKr = Swedish kronor.

Appendix 4: ASTAE-Supported World Bank Investment Projects in East Asia and Pacific and South Asia

Appendix tables 4-1 and 4-2 list World Bank projects that have benefited from ASTAE support since its inception. Table 4-1 covers active projects and table 4-2 closed ones. The two tables provide details about ASTAE's World Bank investment leverage.

APPENDIX TABLE 4-1: ASTAE-SUPPORTED WORLD BANK INVESTMENT PROJECTS

Country			Projects	Approval-End date (estimated)	Sustainable Energy Project Cost (US$ million)						Primary Project Component
					Total cost	Source of financing					
						IBRD/ IDA	GEF	Govt.	Private	Other	
FY12	47	Indonesia	Geothermal Clean Energy Investment Project	07/11–FY16	574.7	175.0		274.7		125.0	Investment in geothermal power generation capacity
	46	Pakistan	Natural Gas Efficiency Project	04/12–FY18	272.0	200.0		72.0			Reduce physical and commercial gas losses
	45	Mongolia	Ulaanbaatar Clean Air Project	04/12–FY17	21.9	15.0		6.9			Access to energy-efficient heating stoves
	44	Vietnam	Clean Production and Energy Efficiency Project	07/11–FY16	4.1		2.3	1.8			Energy efficiency and energy services companies
	43	China	Energy Efficiency Financing III Project	09/11–FY17	428.0	100.0		200.0	128.0		Energy efficiency in medium and large industrial enterprises
TOTAL FY12					**1,301.5**	**490.0**	**2.3**	**555.4**	**128.0**	**125.0**	
FY10	42	Lao PDR	Rural Electrification II	01/10–FY14	37.6	24.4	1.8	4.0	3.4	4.0	Increase rural households' access to electricity
	41	India	Financing Energy Efficiency in SMEs	05/10–FY14	57.6		11.3	0.3	46.0		Increased energy efficiency in small and medium enterprises
	40	China	Energy Efficiency Financing II	06/10–FY15	101.6	100.8		0.8			Catalyze commercial investments in industrial energy efficiency
	39	Vietnam	System Efficiency Improvement, Equitization and Renewables, additional financing	06/10–FY13	3.5	3.5					Renewable energy and demand-side management
FY09	38	Solomon Islands	Solomon Islands Sustainable Energy	07/08–FY13	4.5	4.0		0.5			Electricity loss reduction and increased access
	37	Philippines	Additional Financing for Rural Power	04/09–FY13	48.4	40.0	0.5			7.9	Renewable energy for rural applications
	36	Vietnam	Renewable Energy Development	05/09–FY15	318.0	202.0		64.0	49.7	2.3	Increased renewable-energy share in electricity mix, technical assistance, and lending

Country			Projects	Approval-End date (estimated)	Sustainable Energy Project Cost (US$million)						Primary Project Component
					Total cost	Source of financing					
						IBRD/ IDA	GEF	Govt.	Private	Other	
FY09	35	China	Thermal Power Efficiency	05/09–FY16	109.0		19.7	15.5	73.8		Efficient dispatch and increased thermal plant efficiency
	34	Vietnam	Rural Energy II - Additional Financing	05/09–FY16	250.6	200.0		38.8		11.8	Improved and new electricity access
FY08	33	Indonesia	Geothermal Power Generation Development	05/08–FY13	9.0		4.0	5.0			Geothermal power scaling up, and capacity building
	32	China	Energy Efficiency Financing	05/08–FY13	593.6	200.0	13.5	6.3	373.8		Energy efficiency for industry
	31	China	Liaoning Third Medium Cities Infrastructure	05/08–FY13	375.9	191.0		184.9			Improved efficiency of heating and gas services
	30	Vietnam	Rural Distribution	05/08–FY13	204.2	150.0		54.2		3.0	Electricity network efficiency improvement
FY07	29	Pacific Islands	Sustainable Energy Financing	05/07–FY16	58.5		9.5	20.2	22.1	6.7	Renewable energy scaling up
FY06	28	Vietnam	Rural Energy II	11/04–FY14	329.5	220.0	5.3	70.0		35.0	Renewable energy for remote communities
	27	China	Heat Reform and Building Efficiency	03/05–FY14	52.6		18.0	0.9	33.7		Energy efficiency
FY05	26	Philippines	Rural Power	12/03–FY13	26.7	10.0	9.0	0.2		7.5	Renewable energy for rural applications
	25	Philippines	Power System Loss Reduction	06/04–FY14	62.3		12.0	0.3		50.0	Rural electrification and efficiency
FY04	24	Vietnam	System Efficiency Improvement, Equitization and Renewables	06/02–FY13	24.5	17.2	4.5	2.8			Renewable energy and demand-side management
TOTAL ALL PROJECTS UNDER IMPLEMENTATION					3,969	1,853	111	1,024	731	253	

Note: GEF = Global Environment Facility; IBRD = International Bank for Reconstruction and Development; IDA = International Development Association; PDR = People's Democratic Republic; SME = small and medium enterprises.

APPENDIX TABLE 4-2: PAST ASTAE-SUPPORTED WORLD BANK INVESTMENT PROJECTS

Country	Projects	Approval-End date (estimated)	Sustainable Energy Project Cost (US$million)						Primary Project Component
			Total cost	Source of financing					
				IBRD/ IDA	GEF	Govt.	Private	Other	
TOTAL FOR CLOSED PROJECTS			1,292	305	142	232	463	145	
Mongolia	Renewable Energy and Rural Electricity	01/07–06/12	23.0	3.5	3.5	10.0		6.0	Renewable energy and rural electricity access
Timor-Leste	Gas Seep Harvesting	03/07–12/11	1.5	0.9	0.6				Gas seep for power generation
Timor-Leste	Energy Service Delivery	06/07–06/12	8.5	4.5		2.0	2.0		Loss reduction, renewable-energy development, and community-based access
China	Renewable Energy Scale-Up Program P1	01/06–12/11	132.4	86.3		30.1	16.0		Wind farm and small hydro
Lao PDR	Lao PDR Rural Electrification (SPRE II)	04/06–03/12	36.3	10.0	3.7	8.2		14.3	Renewable energy for rural application
Cambodia	Rural Electrification and Transmission	12/03–01/12	32.0	16.0	5.8			10.2	Renewable energy for rural applications
Papua New Guinea	Teachers Solar Lighting Project	06/05–08/10	2.9		1.0	0.1	1.7	0.1	Renewable energy (photovoltaic) for teachers in rural areas
China	Renewable Energy Scale-Up Program	06/05–09/10	336.0	87.0	40.2	42.0		67.0	Renewable energy and energy efficiency
Vietnam	Demand-Side Management	06/03–06/10	18.6		5.5	1.2	6.7	5.2	Demand-side management support
China	Energy Conservation II	10/02–06/10	242.5		26.0		216.5		Energy services company market development
China	Hebei Urban Environment	06/00–06/08	5.0	4.0		1.0			Energy efficiency in water utilities
Vietnam	Rural Energy I	05/00–12/06	2.5	1.0				1.5	Renewable energy, technical assistance, and pilot mini hydro
China	Renewable Energy Development	01/98–06/07	205.4	13.0	27.0		165.4		Wind farms, photovoltaic, photovoltaic technology improvement
Vietnam	Transmission, Distribution, and Disaster Reconstruction	01/98–06/07	3.3			0.5		2.8	Demand-side management, capacity building, equipment standards
China	Energy Conservation	03/98–06/06	150.8	63.0	22.0	7.0	54.3	4.5	Energy efficiency, technical assistance
China	Passive Solar Heating for Rural Health Clinics	06/01–06/04	1.5		0.8	0.8			Energy-efficient building design
Lao PDR	Southern Provinces Rural Electrification	03/88–06/04	2.2	1.0	0.7	0.5			Solar battery charging and micro hydro projects
Thailand	Metropolitan Distribution Reinforcement	06/97–06/04	4.0			2.5		1.5	Demand-side management, capacity building

Country	Projects	Approval-End date (estimated)	Sustainable Energy Project Cost (US$ million)						Primary Project Component
			Total cost	Source of financing					
				IBRD/ IDA	GEF	Govt.	Private	Other	
Indonesia	Solar Home Systems	01/97–06/04	3.4	0.1	2.3		1.0		Solar home systems and technical assistance
Vietnam	Power Development	02/96–06/00	1.6	0.5				1.1	Renewable-energy capacity building
Indonesia	Second Rural Electrification	02/95–09/00	19.3	13.3		6.0			Mini hydro, geothermal resource assessment
Thailand	Distribution System and Energy Efficiency	04/93–06/00	59.3		8.0	20.3		31.0	Demand-side management, capacity building
Lao PDR	Provincial Grid Integration	10/92–01/00	0.9	0.9					Demand-side management, institution building

Note: GEF = Global Environment Facility; IBRD = International Bank for Reconstruction and Development; IDA = International Development Association; PDR = People's Democratic Republic.

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