

# 2012

ANNUAL REPORT





## MISSION

The Energy Sector Management Assistance Program (ESMAP) is a global knowledge and technical assistance program administered by the World Bank. It provides analytical and advisory services to low- and middle-income countries to increase their know-how and institutional capacity to achieve environmentally sustainable energy solutions for poverty reduction and economic growth. ESMAP is funded by Australia, Austria, Denmark, Finland, France, Germany, Iceland, Lithuania, Norway, Sweden, the Netherlands, and the United Kingdom, as well as the World Bank.

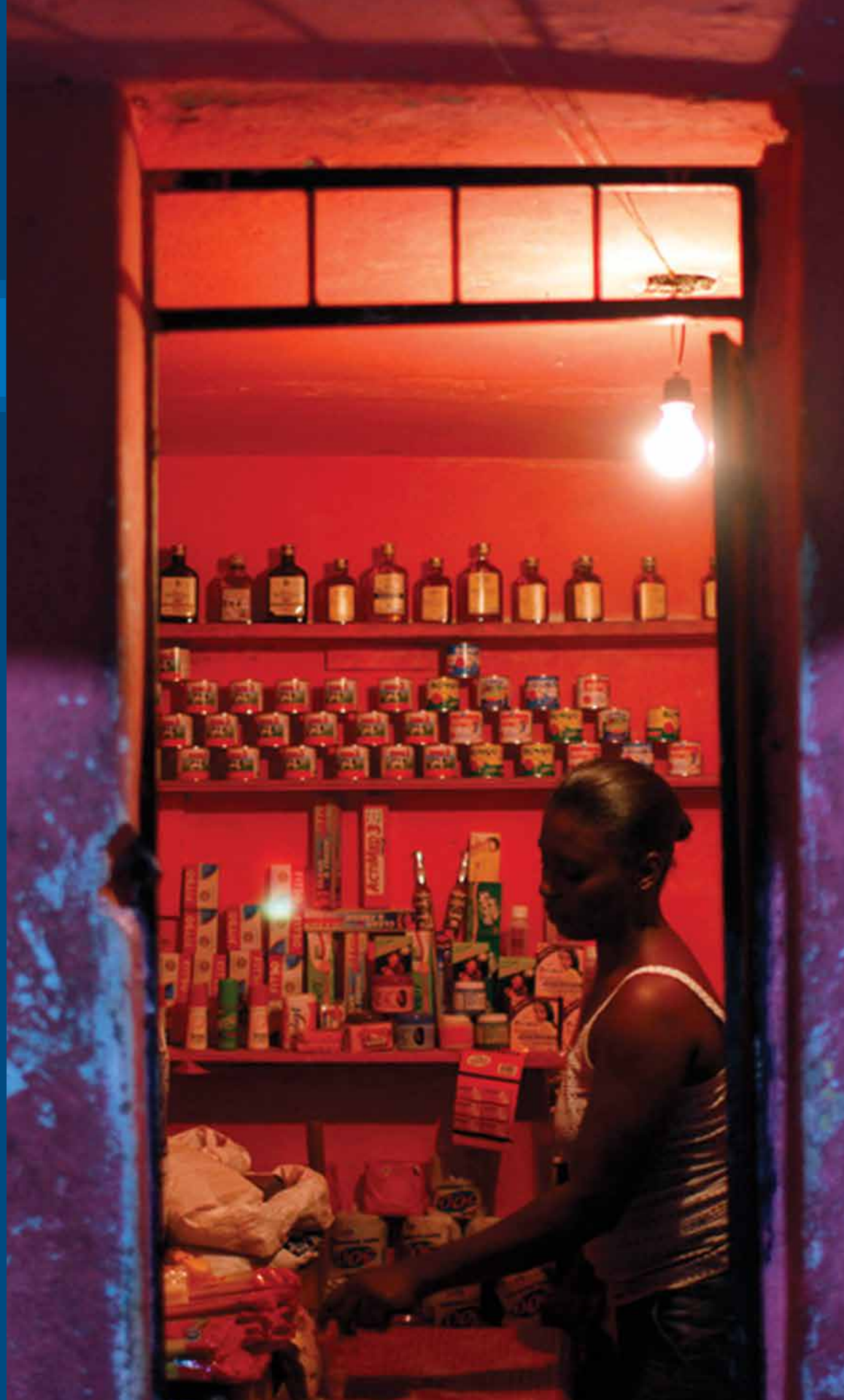
# CONTENTS

|   |           |
|---|-----------|
| <b>CHAPTER 1   COMPLEX CHALLENGES, DYNAMIC OPPORTUNITIES . . . . .</b>                              | <b>1</b>  |
| Leverage and Impact . . . . .   | 2         |
| Key Achievements. . . . .   | 2         |
| Program Reorientation . . . . .   | 5         |
| Support to World Bank Regions . . . . .   | 11        |
| Lessons Learned . . . . .   | 11        |
| Focus on Results . . . . .  | 12        |
| <br>  |           |
| <b>CHAPTER 2   ACCELERATING THE TRANSITION TO CLEAN ENERGY AND LOW CARBON DEVELOPMENT . . . . .</b> | <b>15</b> |
| FY2012   HIGHLIGHTS AND ACHIEVEMENTS . . . . .  | 16        |
| Low Carbon Development . . . . .  | 16        |
| Planning Tools . . . . .  | 18        |
| Energy Systems and Climate Risk. . . . .  | 18        |
| Tapping the Potential of Geothermal. . . . .  | 21        |
| Expanding Roles for Solar and Hydropower . . . . .  | 22        |
| Grids and Renewables . . . . .  | 23        |
| Renewable Energy Training . . . . .   | 24        |
| 2013 AND BEYOND   NEW INITIATIVES . . . . .   | 24        |
| <br>  |           |
| <b>CHAPTER 3   CREATING PATHWAYS TO SUSTAINABLE ENERGY FOR ALL . . . . .</b>                        | <b>27</b> |
| FY2012   HIGHLIGHTS AND ACHIEVEMENTS . . . . .  | 28        |
| Joining a Global Campaign . . . . .   | 28        |
| AFREA . . . . .   | 29        |
| Expanding South-South Knowledge Exchange<br>in Africa . . . . .                                     | 33        |
| Focusing on Cookstoves and Household Fuels . . . . .  | 35        |
| Reaching the Urban Poor . . . . .   | 36        |
| 2013 AND BEYOND   NEW INITIATIVES . . . . .   | 36        |

|   |           |
|---|-----------|
| <b>CHAPTER 4   FOSTERING SUSTAINABLE, ENERGY EFFICIENT CITIES</b>                               | <b>41</b> |
| FY2012   HIGHLIGHTS AND ACHIEVEMENTS  | 42        |
| Identifying High-Yield Actions for Cities   | 42        |
| A Focus on Energy Efficiency in the Water and Transport Sectors                                 | 43        |
| Harnessing the Potential of Procurement   | 45        |
| Emerging Opportunities around the World   | 46        |
| 2013 AND BEYOND   NEW INITIATIVES   | 47        |
| <br>  |           |
| <b>CHAPTER 5   DEVELOPING EFFECTIVE ENERGY SECTOR POLICIES, PRACTICES, AND INSTITUTIONS</b>     | <b>51</b> |
| FY2012   HIGHLIGHTS AND ACHIEVEMENTS  | 52        |
| META   Assessment of Electricity Supply Options   | 52        |
| Policy Dialogue and Power Sector Support in South Asia  | 53        |
| Power Integration in the Middle East and North Africa   | 54        |
| Helping Mitigate the Risks from High and Volatile Oil Prices                                    | 54        |
| 2013 AND BEYOND   NEW INITIATIVES   | 55        |
| <br>  |           |
| <b>CHAPTER 6   FINANCIAL REVIEW</b>   | <b>61</b> |
| <br>  |           |
| <b>ANNEX I   PROCEEDINGS OF CG MEETING, 2012</b>  | <b>67</b> |
| <b>ANNEX II   ESMAP PROGRAM OUTPUTS, FY2012</b>   | <b>72</b> |
| <b>ANNEX III   WORLD BANK GROUP LENDING OPERATIONS INFLUENCED BY ESMAP ACTIVITIES FY2009–12</b> | <b>81</b> |
| <b>ANNEX IV   NEW, ONGOING AND COMPLETED ACTIVITIES, FISCAL YEAR 2012</b>                       | <b>87</b> |
| <b>ANNEX V   PUBLICATIONS, FY2012</b>   | <b>94</b> |
| <b>ACRONYMS</b>   | <b>98</b> |







# COMPLEX CHALLENGES, DYNAMIC OPPORTUNITIES

Countries across the world face increasingly complex choices as they map out their energy future. Lack of access to modern energy services continues to hinder opportunities for poverty reduction and shared prosperity for 2.8 billion people relying on the traditional use of biomass for cooking and 1.15 billion people without electricity. Fossil fuel subsidies are putting strains on government budgets and undermining a level playing field for renewable energy options. Utilities struggle with poor governance and a lack of cost-reflective tariffs. Poor reliability and quality of energy supply hampers economic growth and competitiveness for many developing countries. At the same time, rising greenhouse gas (GHG) emissions have put the world on track to exceed the 2°C increase in global temperatures seen as the upper limit to ward off dangerous impacts of climate change.

Policy makers are faced with the fact that, while the cost of renewable energy has come down, it is still not cost competitive in many situations, and integrating renewables into existing grids is a challenge due to their variability and location. Smart grids and efficiency options hold out the possibility of managing energy consumption, but demand



continues to grow steadily. Rural electrification and access to clean cooking and lighting solutions remain an imperative for many governments, but large and growing urban and peri-urban populations face limited access to energy services as well.

As it has for almost 30 years, the **Energy Sector Management Assistance Program (ESMAP)** is actively helping low- and middle-income countries meet such challenges and take advantage of new opportunities. As a knowledge and technical assistance program within the World Bank, ESMAP supports a wide range of analytical and advisory activities that in turn inform and influence the overall energy portfolio and country sector dialogue of the World Bank Group (WBG).

## LEVERAGE AND IMPACT

Over the past four fiscal years alone (FY2009–12), ESMAP has contributed to the identification and design of approved WBG lending of **US\$ 14 billion**. These lending operations in turn leveraged a further US\$ 13.2 billion in funding from public, private, and other international sources. Furthermore, ESMAP activities have helped to facilitate the shift to environmentally sustainable energy sector development in client countries. ESMAP's most recent portfolio review<sup>1</sup> finds evidence that the recent increase in the World Bank's low carbon lending, including a tripling of the lending for renewable energy and doubling of the lending for energy efficiency, was underpinned by ESMAP's analytical and advisory activities. The same portfolio review also found that ESMAP had

helped establish enabling conditions for electricity markets and well-functioning transmission systems in a number of client countries, and to have informed regional energy trade and integration efforts in Africa, the Middle East, Central Asia, and South Asia.

In Africa, ESMAP's **Africa Renewable Energy and Access Program (AFREA)** has carried out pilot activities on gender, household energy, renewable energy, and energy access that have directly facilitated the scale-up of World Bank operations and client country initiatives. For example, in Rwanda, ESMAP helped develop national energy access plans that were then implemented through a US\$ 70 million loan from the World Bank and a US\$ 228 million commitment from other donors. The World Bank-financed project, still under implementation, has more than doubled household connections and is on track to reach a target of 350,000 connections by 2014. In Mali, an ESMAP grant enabled the World Bank-financed Household Energy and Universal Access project to expand access to electricity to 30,000 households and 500 schools, health clinics, and government buildings, as well as to distribute 550,000 improved cookstoves.

## KEY ACHIEVEMENTS

One of the most important international developments in FY2012 was the launch of the **Sustainable Energy for All (SE4All)** initiative by UN Secretary General Ban Ki-moon. ESMAP

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<sup>1</sup> For the latest ESMAP Portfolio Review, go to <http://www.esmap.org/node/1357>.





provided key early analytical support for SE4All in FY2012, conducting assessments and gap analyses of energy access in selected countries and helping to shape the country action agenda for the initiative (see Box 1.1 and Chapter 3).

Among ESMAP's other main achievements in FY2012 were:

- Completion of the **Low Carbon Growth Country Studies** series, which have supported seven of the world's largest emerging economies as they develop strategies to reduce GHG emissions while still meeting national growth objectives. This series has now informed US\$ 3 billion in World Bank lending and six national policies and strategies
- Global deployment of the **Tool for Rapid Assessment of City Energy (TRACE)**, which has now been used by 12 cities around the world to quickly assess energy efficiency options and decide on areas for improvement
- Continued support to **Lighting Africa**, which has expanded to reach 4 million people in Sub-Saharan Africa with improved, clean, quality-certified off-grid lighting systems
- Launch of the **Model for Electricity Technology Assessment (META)**, which will allow national policymakers and utility planners to compare costs over a comprehensive range of power generation project-level options, including renewables, while taking into account environmental externalities
- Development of a comprehensive series of training events for WBG staff and partners on renewable energy technologies, financing, and policies, designed to help World Bank teams and their clients apply



## CONSULTATIVE GROUP

ESMAP is governed by a Consultative Group (CG) made up of representatives from contributing donors and chaired by the Director of the World Bank's Sustainable Energy Department, on behalf of the Vice President of the World Bank's Sustainable Development Network. The CG meets annually to review the strategic directions of ESMAP, its achievements, and its use of resources and funding requirements.

ESMAP's donors in FY2012 were:

Australia  
Austria  
Denmark  
Finland  
France  
Germany  
Iceland  
Lithuania  
Norway  
Sweden  
The Netherlands  
United Kingdom  
The World Bank Group

the latest knowledge about renewable energy to policy development and investment support

- A global dialogue on energy access for the urban poor among national and municipal policymakers, representatives of utilities, and technical experts, resulting in sharing of experiences and lessons on how energy services can be improved for low-income urban communities

## TECHNICAL ADVISORY GROUP

A Technical Advisory Group (TAG) of international experts appointed by the CG provides informed, independent opinions to the CG about the purpose, strategic direction, and priorities of ESMAP. The TAG also provides expert advice and suggestions to the CG on current and emerging global issues in the energy sector likely to impact ESMAP's client countries.

In FY2012, the members of the TAG were:

Wolfgang Mostert  
Winfried Rijssenbeek  
Judi Wakhungu

- Publication of the *Primer on Energy Efficiency for Municipal Water and Wastewater Utilities*, which lays out efficiency measures that could lead to energy savings of 5 to 25 percent at utilities in developing countries. This study has since been used to advise the national water utility for Uruguay on sustainability measures
- Launch of a two-year work program to explore ways to apply results-based approaches to energy sector development (see Box 1.2)
- Launch of the **SIDS DOCK** partnership with UNDP and the Alliance of Small Island States to support small island developing states to increase resilience in their energy sectors and transition to more sustainable sources of supply (see Box 1.3)
- Approval by the World Bank's Board of Directors of nine lending operations

## ABOUT ESMAP

ESMAP is a global technical assistance program administered by the World Bank and situated in the World Bank's Sustainable Energy Department in Washington, D.C. ESMAP's program includes both regional and country-focused activities implemented by the regional units of the World Bank, and global initiatives managed by the ESMAP core program unit. The ESMAP core unit of about 25 staff is responsible for the day-to-day management of the program, following the strategy laid out in ESMAP's business plan as approved by the Consultative Group. The unit comprises teams working on clean energy, energy access, energy efficient cities, energy assessments and strategy, communications, and monitoring and evaluation.

informed by ESMAP analytical and advisory activities, totaling US\$ 1.3 billion

## PROGRAM REORIENTATION

In response to growing demand from client countries and from the regional units of the World Bank, ESMAP continued the reorientation it began in FY2011 to find innovative solutions to help clients meet their emerging energy challenges. This reorientation is based on five core principles, first articulated in the planning for FY2012, which will guide its work in FY2013 and beyond:

- **Help shape the future** | ESMAP's focus will be on research and analysis that influences the strategic directions of the energy sector. ESMAP's current portfolio should be a leading indicator of the World Bank's future energy portfolio.
- **Maintain relevance to regional operations** | The strength of ESMAP as a global program has been its strong links to country clients through the World Bank's regional operations units. Operational leveraging has been accomplished primarily through the system of Annual Block Grants (ABGs) to the regions, which has been effective due to its responsiveness to demand, flexibility, and streamlined decision-making.
- **Working across teams** | ESMAP's teams will be cross-cutting and able to respond to emerging challenges, drawing on the expertise of staff working across different programs and initiatives.
- **Scaling-up to respond to increased client demand** | WBG energy lending, particularly financing for renewable energy and low carbon development, has increased substantially over the past five years. This has been accompanied by increasing demand from clients for more analytical work and technical assistance to help define policy options and program priorities, as well as to identify and adapt good practices.
- **Measure results and demonstrate impacts** | ESMAP will invest resources and management attention to measuring the performance of its programs. Accountability for outputs and outcomes will be critical elements in the program's monitoring and evaluation processes. This means more consistent reporting on baseline and target values, more robust indicators, and more results-oriented programming.





## SUSTAINABLE ENERGY FOR ALL

Lack of access to electricity and modern energy services has a tremendous negative impact on human health and development for a large share of the global population. Continued emissions of GHGs at current or rising levels threatens to raise global temperature above 2°C, posing the danger of extreme heat-waves, declining global food stocks, loss of ecosystems and biodiversity, and life-threatening sea level rise. The global Sustainable Energy for All initiative (SE4All) addresses these two interlocked energy challenges, calling on governments, businesses, and civil society to achieve three goals by 2030:

- Universal access to electricity and clean cooking fuels
- Doubling the share of the world's energy supplied by renewable sources from 15 percent to 30 percent
- Doubling the rate of improvement in energy efficiency

SE4All was initiated in September 2011 by UN Secretary General Ban Ki-moon, and 2012 was declared by the United Nations as the global Year of Sustainable Energy for All. The World Bank voiced its support for the initiative in late 2011, and in June 2012, announced specific commitments to help meet the SE4All goals. ESMAP was at the heart of many of those commitments, which were announced at the UN's Rio+20 Summit. Specifically, the World Bank pledged to:

- double the leverage of its energy lending, with an emphasis on low carbon energy;
- provide technical assistance, policy guidance, and financing to help up to five selected countries establish energy access plans;
- expand access programs, such as Lighting Africa, to provide affordable lighting to 70 million low-income households by 2020;
- advance the clean cooking agenda by supporting clean cookstoves and household fuels programs in Africa, South and East Asia, and Central America;
- support development of geothermal power in developing countries;
- support cities in improving energy efficiency;
- expand the Global Gas Flaring Reduction partnership, to capture and productively use previously flared gas;
- help countries undertake mapping of renewable energy resources; and
- support small island developing states' investments in clean energy.

ESMAP provided key early support for SE4All in FY2012, conducting rapid assessments and gap analyses of energy access in selected countries and helping to draft the terms of reference for the SE4All task force working on energy access (see chapter 3).

In September 2012, World Bank President Jim Yong Kim announced he would join UN Secretary General Ban Ki-moon as co-chair of the multi-stakeholder advisory board that provides strategic guidance to SE4All.

## BOX 1.2

### RESULTS-BASED APPROACHES FOR ENERGY SECTOR DEVELOPMENT

Results-based approaches are now widely used in development programs and accepted by donor and client countries, but their deployment in the energy sector has been limited compared to other sectors. ESMAP launched a work program in FY2012 to assess how results-based approaches can be used to improve outcomes and scale up financing for energy sector development.

This program has three components: (i) analytical work on the definitions and possible application of results-based approaches, (ii) knowledge management to disseminate guidance on designing results-based projects, and (iii) operational support to help develop a pipeline of projects to test out new concepts and ideas. A particular focus will be increasing access to modern energy services as a result of opportunities available through the Climate Investment Funds (CIFs) and the Energy+ Partnership.

ESMAP launched this work in May 2012 with a session at its annual Knowledge Exchange Forum to share lessons from the use of results-based approaches in other sectors, such as water and sanitation, health, transport, and information and communication technology (ICT).

energy. The program merged ESMAP's renewable energy and climate change activities under a single umbrella. In FY2012, this program initiated new work to support expanded deployment of geothermal energy in developing countries; continued ESMAP's support to the scale up of concentrated solar power (CSP); launched analytical work on the integration of renewable sources of power into existing grids; developed new tools on management of climate risk for energy systems; began a series of trainings on renewable energy targeted at WBG staff; and completed the Low Carbon Growth Country Study series. Going forward, ESMAP's work on geothermal is expected to increase in size and scope. Other new initiatives include 'meso-scale' mapping of renewable energy resources in countries with high potential. For more details, see chapter 2.

Fighting energy poverty has risen to the top of the global development agenda, and ESMAP has substantially increased its work in **energy access** in recent years. A particular focus has been household energy, where ESMAP is supporting a number of regional initiatives, including **Africa Clean Cooking Energy Solutions (ACCES)**, and the Central America Improved Cookstoves Framework Study. ESMAP has joined with the Global Alliance for Clean Cookstoves (GACC) to support ACCES and to conduct a global study to identify barriers currently preventing clean cookstoves and fuels from being adopted at scale. ESMAP's Energy Access program is a key component of, and is providing important inputs in support of, the World Bank commitments to the SE4All initiative. In particular, ESMAP will launch a technical assistance program to support selected

## BOX 1.3

### SUPPORTING RESILIENT, SUSTAINABLE ENERGY FOR SMALL ISLAND DEVELOPING STATES

Small Island Developing States (SIDS) are often highly dependent on imported fossil fuels to meet their energy needs. As a result many SIDS experience high costs for electricity, supply interruptions, and fiscal impacts during oil-price increases. Despite their renewable energy resource potential—solar, wind, ocean, geothermal, and biomass energy are often abundant—many SIDS are limited by the existing structure of their energy sectors and inadequate institutional and private sector capacity for the development of such resources.

To help meet this challenge, ESMAP joined with the United Nations Development Programme (UNDP), the Alliance of Small Island States (AOSIS), and the Government of Denmark, to establish the SIDS DOCK Support Program. The Government of Japan has also pledged funding.

SIDS DOCK is designed to help achieve the transformation of the energy sectors in these countries by:

- Creating an enabling regulatory and institutional environment to remove barriers on the implementation of renewable energy and energy efficiency policy reforms based on international best practices
- Implementation of renewable and energy efficiency projects that demonstrate the potential for scale-up through climate finance and other sources of funding

Since the launch of SIDS DOCK in September 2011, ESMAP has approved funding for a number of initiatives in the Africa, Caribbean, and Pacific regions, including a study of the feasibility of interconnecting electricity grids in the Caribbean, preparation of grid codes for Mauritius and the Seychelles, assessing energy efficiency options in São Tomé and Príncipe, and geothermal power development in Vanuatu and Dominica.

In addition, a package of technical assistance requested by SIDS DOCK member countries is being developed, including analytical work to explore options for financing mechanisms and the establishment of a virtual knowledge exchange network. ESMAP has also partnered with the Ashden Awards to organize an innovation competition for renewable and efficiency projects in SIDS that can be replicated or expanded.

As part of this reorientation, ESMAP has expanded activities under its four reconfigured program areas: clean energy, energy access, energy efficient cities, and energy assessments and strategies.

ESMAP's **clean energy** program was formed in FY2011 to consolidate ESMAP's support in promoting and informing new policies, institutions, regulations, and investments that enable the transition to more sustainable forms of







countries to develop investment prospectuses, as part of their national energy access plans and programs. ESMAP's Energy Access program also encompasses the **Africa Renewable Energy and Access program (AFREA)**, which marked substantial achievements in FY2012 towards expansion of improved off-grid lighting, cleaner cooking solutions, and integration of gender considerations into clients' energy programs, in Sub-Saharan Africa. For full details of ESMAP's energy access work in FY2012 and plans for FY2013 and beyond, see chapter 3.

The **Energy Efficient Cities Initiative (EECI)** was established in FY2009 to promote sustainable growth in cities by helping city planners and administrators make better-informed decisions about their energy efficiency choices. The initiative has expanded the use of the flagship TRACE decision-support tool from an initial pilot in Quezon City in the Philippines in FY2010 to 12 cities across the world by FY2012, with plans to scale up deployment in FY2013 and beyond. ESMAP continues to produce a wide range of globally applicable analytical work on energy

efficiency, such as a review of efficiency options for municipal water utilities and a study of public procurement of energy efficient products. A series of sector-level guidance notes on city energy efficiency is planned for FY2013–14. ESMAP has also supported a series of trainings around the world on urban transport planning that integrates new developments in energy efficiency, environmental planning, and climate change. For full details, see chapter 4.

The **Energy Assessments and Strategies Program** continues to play an important role in ESMAP's engagement with country clients, supporting analytical and advisory work on energy sector planning, policies, and institutions. Substantial work was done in FY2012 on energy price volatility in Latin America, energy policy frameworks in South Asia, and regional energy integration in the Middle East and North Africa. Moving into FY2013 and beyond, the program will complement country-level assessments with global analytical and advisory activities, including work on private sector participation in power grids, social impacts of

energy policy reform, and electricity planning at times of risk, as well as on country-level deployment of the META tool. For further details, see chapter 5.

## SUPPORT TO WORLD BANK REGIONS

As in previous years, a significant proportion of ESMAP funding was allocated to the World Bank's regional operations units through the ABG process. In FY2012, a minimum of US\$ 500,000 was allocated to each region, plus a variable allocation determined by the region's energy lending volume and other performance criteria (see chapter 6 for exact allocations), which was further supplemented by US\$ 6 million for Africa through the AFREA program. New activities funded through the ABG process include a low carbon power sector strategy for Tunisia, energy planning technical assistance in Peru, and support to reform of electricity cooperatives in the Philippines. In all, 26 new activities were approved in FY2012 through the ABG process (see annex 4).

ESMAP successfully mobilized cofunding for ABG activities through partnerships with the Global Partnership for Output-Based Aid (GPOBA), the Public-Private Infrastructure Advisory Facility (PPIAF), and the Climate and Development Knowledge Network (CDKN). In FY2012, GPOBA and PPIAF approved US\$ 900,000 to cofinance ESMAP activities to promote energy access in Africa, thereby increasing the overall resource envelope for the region by 50 percent. ESMAP has also brokered a partnership with CDKN that has helped leverage

CDKN funding toward three technical assistance projects in two regions (two in Africa and one in Central Asia), for a total of US\$ 1.82 million.

## LESSONS LEARNED

ESMAP continues to incorporate lessons learned and act on recommendations from stakeholders to better target its initiatives and strengthen its operations. ESMAP underwent a comprehensive, independent external evaluation in FY2012 designed to assess its effectiveness as a global technical assistance program and to recommend how to better achieve the program's objectives. That evaluation found that ESMAP's program was "consistent with current global / regional challenges and concerns in the energy sector... [as well as] with the needs and priorities of its client countries," but also recommended that ESMAP maintain clear, targeted areas of focus to continue to meet those priorities and challenges. Building on that evaluation, and the change process started in FY2011, ESMAP is taking a number of steps to better adapt its programs to current needs. These include:

- A periodic assessment of long-range trends affecting future energy sector development, such as the energy-food-water-climate change nexus
- A new logframe for the upcoming strategic business plan that links activities to higher level development outcomes
- Starting in FY2013, all new activities to be screened for gender considerations
- ESMAP's gender work to expand beyond energy access and be integrated into all program areas



- All new funding proposals to require identification, description, and rating of all associated risks, and possible steps to take to mitigate those risks

## FOCUS ON RESULTS

As it continues its reorientation in line with the principles put forth in FY2011, ESMAP has also substantially strengthened its monitoring, evaluation, communications, and dissemination capacities in the past two years.

ESMAP has brought its systems in line with the World Bank's results framework for technical assistance, establishing new online project templates with clearly defined objectives and expected results, and simplified reporting. At the same time, ESMAP has enhanced its procedures to ensure consistent reviews of global own-managed and regional activities from identification until completion and dissemination. An Operational Manual for ESMAP was published for the first time in FY2012, which includes quality assurance guidelines for both regional and global own-managed activities, as well as guidelines for recipient-executed activities financed by ESMAP.

ESMAP has also developed a web-based system for comprehensive monitoring and evaluation (M&E) of activities. This M&E Portal, online since the beginning of 2012, tracks observable outcomes of activities as well as outputs, monitors activities throughout the project cycle, and synchronizes financial data with World Bank systems.

As ESMAP's portfolio grows in response to greater demand from stakeholders, it also has faced considerably greater needs for communication and dissemination support. In FY2012, ESMAP hired a Communications Officer, developed a new communications strategy, and put in place an integrated communications, publications and web team. This team has already updated and improved ESMAP's website, E-Bulletin, brochures, and other collateral; established a new series of technical reports; streamlined processes for production of reports and other knowledge products; and substantially expanded the format of ESMAP's Knowledge Exchange Forum held in May 2012.

A key priority for the Communications Team in FY2013–14 is improving and expanding the dissemination of ESMAP knowledge products so that they reach and are used by those audiences and stakeholders who are best positioned to transform this knowledge into new policies, programs, and lending operations. To this end, the team is working closely with ESMAP technical staff and World Bank regional units to identify, highlight, and distribute knowledge products that would benefit from cross-regional and global dissemination.

Other areas of focus are expansion of ESMAP knowledge sharing and South-South knowledge exchange events, and use of a wide range of new dissemination channels, including peer-reviewed journals and World Bank social media channels.

While there have been significant achievements in the past two years, ESMAP's reorientation to better serve its clients through support to the

World Bank's regional units and to improve its emphasis on high-impact opportunities is a work in progress. ESMAP will continue to adapt its programs and grants to meet emerging challenges and new opportunities, and seek to

improve value for money, as it continues to fulfill its unique function within the World Bank at the nexus of energy, climate change, and development.





# ACCELERATING THE TRANSITION TO CLEAN ENERGY AND LOW CARBON DEVELOPMENT

**G**lobal investment in clean energy continues to grow, and developing countries are leading the way as they put low carbon energy at center stage in their efforts to support economic growth and poverty reduction. Clean energy sources are attractive for many reasons, including supply diversification, increased energy security, fostering new industries and skill diversification, reducing air and water pollution, and contributing to global efforts to reduce GHG emissions.

This increased demand for clean energy in developing countries has led to a surge in WBG lending to renewable energy projects, growing from US\$ 840 million in FY2007 to US\$ 3.6 billion in FY2012, and now representing 44 percent of all energy lending. Over the six-year period since FY2007, the WBG has provided a total of US\$ 12.5 billion for renewable energy projects and programs, representing just over

one quarter of all energy lending for the period. With this growth has come a corresponding increase in demand for the analytical work and technical assistance that ESMAP provides to support policy development and investment preparation in client countries.

## FY2012 | HIGHLIGHTS AND ACHIEVEMENTS

### Low Carbon Development

FY2012 marked the conclusion of the first phase of ESMAP's Low Carbon Growth Country Studies program, which began in FY2008. These efforts were focused on helping larger economies identify long-term strategies for reducing GHG emissions while meeting economic growth objectives, tied to existing national and sectoral development plans. Low carbon growth studies were conducted with seven of the world's largest emerging economies: Brazil, China, India, Indonesia, Mexico, Poland, and South Africa.

There is no one-size-fits-all model for low carbon development, and given the wide divergence in the countries studied, the results and outcomes of the studies differed markedly. The Mexico study used a cost effectiveness analysis to assess 40 near-term priority mitigation measures that, taken together, could result in Mexico's GHG emissions in 2030 remaining roughly what they were in 2009, but with significant gross domestic product (GDP) and per capita income growth. The largest savings identified were in agriculture and forestry. The study in India looked at five sectors that together represented 75 percent of GHG emissions from energy use in 2007,

### ACHIEVEMENTS IN FY2012 UNDER THE CLEAN ENERGY PROGRAM

- Completion of the Low Carbon Growth Country Studies series, which have supported seven of the world's largest emerging economies as they develop strategies to reduce GHG emissions while still meeting national growth objectives. This series has now informed US\$ 3 billion in World Bank lending and six national policies and strategies.
- Launch of the SIDS DOCK partnership to support small island developing states to increase resilience in their energy sectors and transition to more sustainable sources of supply.
- Development of a comprehensive series of training events for World Bank staff and partners on renewable energy technologies, financing and policies, designed to help them apply the latest knowledge about renewable energy to field operations and better serve country clients.
- Launch of the MACTool, which generates marginal abatement cost curves that allow policymakers and experts to quickly compare the costs of a wide range of mitigation interventions and draws on a solid fact base to present complex options in a concise and visually compelling manner.
- Substantially increased support for work on geothermal, including a partnership with the Government of Iceland, and a survey of resource potential in Central America.



including transport, buildings, and power generation. All scenarios showed emissions increasing, but against a backdrop of a relatively low carbon footprint. Recommendations included energy efficiency measures for industry, transport, and household consumption, along with technical loss reduction measures in power transmission and distribution and enhancements to national grids.

Across the board, the studies demonstrated that large-scale GHG emission reductions are possible even while maintaining economic growth targets and that many interventions can pay for themselves. One of the most important findings of the studies was that the process of low carbon planning can be as important as the recommendations themselves. A successful approach requires a large degree of coordination across sectors, multi-disciplinary teams, and most importantly, building consensus among stakeholders.

The Low Carbon Growth Country Studies series has provided the analytical foundation for US\$ 3 billion in World Bank financing for low carbon development, and informed a number of country-level policies and strategies. ESMAP's South Africa studies—on best practices for power rationing and the design of a Standard Offer Program to encourage demand-side energy management—informed the Government of South Africa's development of energy efficiency goals in its long-term mitigation strategy. The Government of Indonesia has used the results of that country's study to prioritize climate financing opportunities, and has successfully sought financing assistance through the CTF and the Forest Carbon Partnership Facility.

As the first series of studies were being completed, ESMAP initiated support for a wide range of targeted low carbon planning work at the country level. In Vietnam, ESMAP is



working with teams from multiple ministries to help build consensus around realistic low carbon development measures, as part of technical assistance to the government's Support Program in Response to Climate Change, along with other donors (see Box 2.1). In Nigeria, ESMAP is supporting analytical work by the World Bank to help the government organize and prioritize efforts towards low carbon development in the electricity power sector. In Morocco, work is ongoing to help build capacity for new models of power system planning and renewable energy integration that would reduce GHG emissions.

### Planning Tools

ESMAP continues to develop its low carbon planning tools to support deployment by World Bank project teams and client countries. A December 2011 workshop in New Delhi for Indian government planners and academics reviewed how to expand implementation of ESMAP's **Energy Forecasting Framework and Emissions Consensus Tool (EFFECT)**. EFFECT has already been used successfully in India to assess opportunities for low carbon growth by examining CO<sub>2</sub> emissions in the power generation, transportation, buildings, and industrial sectors.

In January 2012, ESMAP officially launched the **Marginal Abatement Cost Tool (MACTool)**, which generates marginal abatement cost curves, recognized as one of the most powerful and concise ways to compare the cost-effectiveness of different GHG emission mitigation options. The tool, developed jointly by ESMAP and the World Bank's Latin America and the Caribbean region, is able to run complex

economic calculations on large volumes of data and present the results in a visually compelling fashion that is easily understandable by non-specialists. In addition to calculating marginal abatement costs, MACTool also calculates technology-specific break-even carbon prices—a measurement of the level of incentives needed to make an option attractive to investors. MACTool is being used extensively by planners in the Brazilian government as part of efforts to assess the feasibility of low carbon options and possible design for a domestic carbon market.

With MACTool, the Model for Electricity Technology Assessment (META), EFFECT, and the TRACE tool for city energy efficiency planning, ESMAP now has a full set of tools to support planners at the national, provincial, and municipal levels to develop low carbon development strategies and to make informed choices in a time of increasing complexity. These tools will be further refined in FY2013 and beyond.

### Energy Systems and Climate Risk

ESMAP is also continuing its work on climate risk and adaptation for energy systems, building on the *Climate Impacts on Energy Systems* flagship report published in FY2011. A rapid assessment toolkit was developed in FY2012 to help countries conduct quick assessments of the state of preparedness of their energy infrastructure. Along with the Commonwealth Scientific and Industrial Research Organisation (CSIRO), ESMAP helped sponsor the International Conference on Meteorology and Energy in Australia in November 2011, which highlighted increasing international attention on the linkages between weather and climate-dependent energy systems.



## BOX 2.1

### **BUILDING CONSENSUS FOR A GREEN GROWTH PATHWAY IN VIETNAM**

Vietnam has been one of the world's fastest-growing economies over the past three decades. Along with that growth has come the expansion of energy-intensive sectors, such as manufacturing, transport, and power generation. Although per capita CO<sub>2</sub> emissions are still low, Vietnam has the 20th highest carbon intensity in the world.

Vietnam is also highly exposed to the effects of climate change, especially to floods, storms, and sea-level rises. Climate-related natural disasters result in economic losses equivalent to 1.5 percent of GDP, and these losses are expected to increase. At the same time, the recent low growth of total factor productivity has raised questions about the quality and sustainability of the country's rapid economic growth. Taken together, these factors have made finding a more sustainable pathway to development a top priority in Vietnam. The government is finalizing a National Green Growth Strategy that highlights the need for emission reduction targets, industrial and consumer energy efficiency, and ecosystem restoration.

The World Bank is expanding its longstanding support to Vietnam to help meet these emerging low carbon development objectives. In support of this effort, ESMAP, with special support from the United Kingdom Department for International Development (DFID), has been providing technical assistance to help the government review its green growth options. A scoping study completed in March 2011 looks at the low carbon development potential in key sectors, such as transport, agriculture, and power. It includes a macroeconomic assessment that gauges the impact of possible mitigation efforts on Vietnam's economic and social development.

ESMAP is supporting the government's preparation of a low carbon reference scenario, a sequence of policies and measures to be implemented over the coming two decades that would impact the course of development in Vietnam. As part of this effort, ESMAP is working with teams from the Central Institute for Economic Management, the Institute of Energy, and the Transport Development and Strategy Institute, to model options using the Energy Forecasting Framework and Emissions Consensus Tool (EFFECT).

At the conference, ESMAP presented a paper on climate risk management approaches for the electricity sector that summarizes lessons for

developing countries from "early adapters." These lessons include close collaboration between the electricity sector and meteorological institutions



## HIGHLIGHTS OF NEW ESMAP-SUPPORTED CLEAN ENERGY ACTIVITIES BY THE WORLD BANK'S REGIONAL UNITS

### WIND POWER MARKET STUDY FOR LEBANON

This technical assistance activity aims to help Lebanese government institutions develop a better understanding of the policy issues it will need to address to develop a larger wind power market in Lebanon. The study will focus on a small pilot wind power project, to be developed with public resources, in order to develop an understanding of wind power development within the country. With an increased understanding of the issues involved in wind power development, the government will be able to fully consider how to develop the wind power market in Lebanon in conjunction with the private sector and other stakeholders.

### TECHNICAL ASSISTANCE TO DEVELOP TOOLS FOR ECONOMIC ASSESSMENT IN THE MIDDLE EAST AND NORTH AFRICA

This activity supports the CSP scale-up initiative in the Middle East and North Africa region by developing decision-making tools for economic assessment of renewable energy projects in the region. In particular, the activity will contribute to improved planning tools for power systems (both generation and transmission), and an assessment of the derived economic benefits of renewable energy scale up.

### TUNISIA | LOW CARBON POWER SECTOR STRATEGY

The Government of Tunisia has expressed interest in revisiting its energy mix strategy to adjust it in order to set the country on a low carbon path, without endangering economic growth and while contributing to job creation. This activity will assist the government in developing an energy strategy that will contribute to the key objectives of energy security, environmental sustainability, economic growth, and job creation. In particular, emphasis will be placed on the implications of the energy strategy on employment and on positioning the energy sector as an engine of sustainable, equitable, and competitive growth.

### CUMULATIVE ENVIRONMENT IMPACT OF HYDROELECTRIC POWER PLANTS IN TURKEY

The objective of this technical assistance is to enhance the capacity of relevant agencies of the Government of Turkey to complete the preparation of the National Basin Management Strategy and to strengthen the government's regulatory framework and implementation capacity for addressing cumulative environmental impacts of hydropower development. Activities will include supporting the work of the National Steering Committee in finalizing the strategy through workshops and broad consultations, helping to develop implementation guidelines on cumulative environmental impact assessments, and strengthening the dialogue on natural resource and water management policy.



to gather and tailor relevant data; supporting the development of operational-level information on risks and adaptation strategies; building a strong economic case for adaptation; and encouraging flexible adaptation approaches in countries where data is limited and resources are constrained.

### **Tapping the Potential of Geothermal**

Geothermal energy has significant potential to deliver a ‘triple win’ for many developing countries—clean, reliable, locally produced baseload power. But as of 2011, only 0.3 percent of the world’s total power generation came from geothermal sources. It is estimated that around 40 countries worldwide have geothermal endowments that could meet a sizeable proportion of their electricity demand. With sufficient investment in drilling and improved

knowledge about resource endowments, geothermal energy could have a much larger role in Central America, the Caribbean, East Africa, and Southeast Asia.

In recognition of this opportunity, ESMAP substantially stepped up its support to geothermal development in FY2012 through analytical and technical assistance activities. In Indonesia, ESMAP supported a lesson-learned study of the World Bank’s multi-year collaboration with national geothermal developer PGE on two projects. These projects, as well as having the potential to power up to 1 million new electricity connections, also hold important lessons for other developing countries just starting to tap their geothermal resources.



ESMAP also published *Drilling Down on Geothermal*, an assessment for Central America that showed the region has total geothermal potential of between 3,000 and 15,000 MW (current installed capacity is less than 500 MW). Moreover, geothermal power is also cost-competitive in Central America when compared to thermal and hydropower generation.

In January 2012, the World Bank and the Government of Iceland joined in a “geothermal compact” to jointly support development of geothermal power in East Africa’s Rift Valley, including in Ethiopia, Burundi, Uganda, Rwanda, and Tanzania. This effort will assist countries in the region as they take on the exploratory phase of geothermal development, help build capacity and technical knowledge, and support development of the policy and legal frameworks required. ESMAP serves as the secretariat for this effort, acting as a liaison between the Government of Iceland and the World Bank’s country energy teams.

ESMAPs work in this area will culminate in FY2013 with the publication of a global *Geothermal Handbook* that details global best practices in financing and planning power generation projects, as well as the launch of a global geothermal plan to mobilize financing for developing countries as they embark on the early, risky stages of development (see FY2013 and Beyond, below).

### Expanding Roles for Solar and Hydropower

FY2012 was a banner year for World Bank efforts on concentrated solar power (CSP), with the approval of the 500 MW Ouarzazate I project in Morocco, slated as one of the largest CSP

installations in the world. CSP remains a priority in the Middle East and North Africa, with over 1,000 MW in projects in development in Egypt, Tunisia, Jordan, Morocco, and Algeria.

ESMAP is continuing to support these efforts. A World Bank technical assistance program has been initiated, based on ESMAP’s study on the potential local economic benefits of CSP, that aims to help governments in the region attract entrepreneurs to manufacture CSP and other



renewable energy technologies locally. ESMAP sponsored a study tour for experts from Morocco, India, Mexico, and South Africa to some of the most technologically advanced CSP plants in the United States in May 2012. A workshop in Tunis in June 2012 brought together officials from Algeria, Egypt, Morocco, and Tunisia to help chart a path to accelerate regional CSP development.

There is growing international consensus on the role that hydropower can play in increasing



energy access for low-income countries with low rates of access, and in boosting energy security for emerging economies. ESMAP has continued to support World Bank efforts in hydropower with analytical studies and advisory work, particularly through the Annual Block Grants (ABGs) to the World Bank's regional units.

An ESMAP study on the potential of small hydropower in Peru, published in FY2011, has led to a US\$ 50 million World Bank rural electrifica-



tion project and the establishment of pilot projects to increase electricity access to small- and medium-enterprises in rural areas. In India, an ongoing ESMAP assessment is looking at the participation of private sector companies in hydropower development, to help inform national strategies on the scale-up of hydropower. This study includes a review of current regulatory frameworks, an inventory of hydropower development in Himalayan states, and an analysis of tariffs, project allotment models, and financing approaches.

In Turkey, ESMAP is supporting advisory work to strengthen the government's regulatory framework and implementation capacity for addressing the cumulative environmental impacts of hydropower development. In West Africa, ESMAP and the Economic Community of West African States' (ECOWAS) Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) helped organize a workshop of ECOWAS states in Liberia in April 2012 to strengthen those countries' approach to small-scale hydropower development, which could substantially help to address the region's ongoing energy crisis.

### Grids and Renewables

With the scale up in renewable energy in developing countries has come a realization that storage, transmission, and distribution systems must be upgraded to integrate and efficiently utilize the new sources of supply. To better understand these issues, ESMAP is working on a global review of adaptation of energy storage systems for renewables, and a report and case studies on the integration of renewables and natural gas into grids. These reports are expected to enhance the knowledge of energy ministries and utilities about the technical, regulatory, and cost aspects of renewable-natural gas hybridization and energy storage.

Smart grids—grids that use information and communication technology to gather and act on information—which were once seen exclusively as the province of industrialized economies, are now generating increased interest from World Bank clients. The WBG's substantial lending in transmission and distribution provides an opportunity for countries to adopt smart grid





systems and components. ESMAP is conducting work on how smart grids can enhance the reliability, cost-effectiveness, and sustainability of power systems. A Smart Grid Knowledge Exchange Portal is being developed to help World Bank project teams locate and share information on smart grids, including road maps, policies and regulations, specific applications, and experiences.

### Renewable Energy Training

With renewable energy representing 44 percent of all WBG energy lending as of FY2012, there is a growing need for World Bank staff to have the latest knowledge and tools at their command. ESMAP, in collaboration with the Advisory Services of the International Finance Corporation (IFC), launched a comprehensive training program on renewable energy for WBG staff in FY2012.

The training series is designed to strengthen staff knowledge so that they can better support clients in renewable energy policy development and implementation. Each module is developed and

delivered by World Bank and external experts, and participants learn about recent development in renewable technologies, policies, and financing through thematic presentations and case studies.

The series was launched in March 2012 with a module on wind power. Another module on solar photovoltaic (PV) power was held in April. In FY2013, modules will be held on geothermal power, financing, grid integration, solar thermal power, policy incentives, and bioenergy. Between sessions, participants are able to access updated content and participate in online discussions through a virtual collaboration platform.

### 2013 AND BEYOND | NEW INITIATIVES

Developing countries are actively trying to scale up renewable energy deployments, but information about renewable resource potential is often scarce or inconsistent. To address this,

ESMAP is preparing a major new **Renewable Energy Resource Mapping** program to support country and regional level mapping for solar, wind, small hydropower, and biomass resources. Funding will be available for ground-based measurement campaigns, data analysis, geographic information systems (GIS) mapping, strategic environmental assessment, and policy integration.

ESMAP's services under this initiative would include:

- Consolidation, validation, and calibration of existing country level renewable energy data
- Best practice guidance on resource mapping requirements and standards, and data handling and integrity issues
- Analytical work to consider issues such as meteorological data, environmental constraints, existing and planned infrastructure, and climate impacts

All resource mapping data, after being presented to the client country government, will be made publicly available at zero cost.

Building on its scaled-up work in support of geothermal energy in FY2012 and the *Geothermal Handbook*, which will be published in early FY2013, ESMAP is preparing a **Global Geothermal Development Plan (GGDP)** in collaboration with bilateral and other multilateral development agencies and banks.

The GGDP aims to be transformational by creating global momentum in geothermal energy investments through a concerted focus on exploratory test drilling, which is the largest financial obstacle

to geothermal energy scale-up. The GGDP will identify and support about a dozen such geothermal resource validation projects globally with a view to creating a robust pipeline for downstream investments in geothermal electricity production. To do so, the GGDP seeks to mobilize around US\$ 500 million in dedicated concessional funding from bilateral and multilateral donors, including international climate finance.

The second objective would be the preparation of individual investment-ready projects which would be presented as part of a candidate investment plan for international climate finance. Early concepts are expected to be presented to donors and recipient countries by November 2012. Ultimately, the goal of the plan is to achieve a significant addition of geothermal electricity production capacity in low- and middle-income countries.

Beyond these major initiatives, ESMAP will continue to help develop the capacity of World Bank staff, partners, and country clients in renewable energy and low carbon development planning. The renewable energy training program will be continued in FY2013 with sessions on financing, grid integration, solar thermal power, policy incentives, and bioenergy. A renewable energy toolkit is being developed that addresses practical implementation needs at each stage of the project development cycle with case studies, sample terms of reference, and examples of financial and economic assessment models. As well as the *Geothermal Handbook*, ESMAP's Clean Energy program will continue to publish practical, action-oriented handbooks on other renewable technologies, including solar and wind power.











## CHAPTER 3

# CREATING PATHWAYS TO SUSTAINABLE ENERGY FOR ALL

**E**nding energy poverty has become a top global priority. There is wide recognition of the negative impacts that a lack of access to modern energy services has on development: children unable to study at night; constrained operating hours and opportunities for small businesses, clinics and markets; health risks for people inhaling indoor smoke from traditional fuels and cookstoves, to name just a few. Worldwide, 1.15 billion people still lack access to electricity and almost 2.8 billion continue to rely on traditional biomass for their cooking and heating needs.

International efforts to change this picture were given a major boost with the declaration of the Sustainable Energy for All (SE4All) initiative by UN Secretary-General Ban Ki-moon in September 2011. The World Bank voiced its support for the initiative in late 2011, and in June 2012, made specific commitments in support of its goals (see Box 1.1). One of the three overarching goals of SE4All is to achieve universal access to energy, including electricity and modern cooking fuels (such as gas and electricity), by 2030. The World Bank has joined development agencies, donors, the United Nations, and a wide range of private sector companies and civil society organizations in their commitment to make this goal a reality.

## FY2012 | HIGHLIGHTS AND ACHIEVEMENTS

### Joining a Global Campaign

With years of analytical and advisory work targeted at fighting energy poverty, ESMAP is playing a key role in the World Bank's support to SE4All, and has contributed a number of important early inputs that have helped to shape the initiative itself.

One of these inputs was the initial framework report for SE4All's Task Force 1, charged with shaping efforts towards the goal of universal energy access. That report declared that "universal energy access can be realized by 2030 with strong engagement from all actors, including governments and public sector organizations, private sector organizations, civil society, community based organizations and energy users." The report goes on to note the need for coordinated action along three parallel "tracks"—national action by governments, expansion of access by private sector actors, and innovative bottom-up approaches led by civil society.

The framework SE4All report calls for support packages for countries to help them achieve universal energy access, depending on their specific potential, needs, and opportunities. The report also calls for improved monitoring and evaluation of progress towards the goal of universal access, particularly at the country level. This framework document has informed ESMAP's current work in support of SE4All, including contributions to the global Tracking Framework for the SE4All goals, and a program of technical assistance for client countries that

### ACHIEVEMENTS IN FY2012 UNDER THE ENERGY ACCESS PROGRAM

- Expansion of Lighting Africa to reach 4 million people in Sub-Saharan Africa with improved, clean, quality-certified off-grid lighting systems.
- Expanded knowledge-sharing events for practitioners and policymakers in Sub-Saharan Africa, including support to the African energy ministers conference prior to COP-17 in Durban, and the second regional forum of the Africa Electrification Initiative.
- Concrete results from pilots in eight African countries under the Biomass Energy Initiative for Africa, which is testing options such as improved cook stoves, modernized charcoal, biofuels, and bio-electricity for their potential inclusion into World Bank lending operations.
- A global dialogue on energy access for the urban poor among national and municipal policymakers, representatives of utilities, and technical experts, resulting in dissemination of case studies where energy services had been improved for low-income urban communities.
- Launch of the *Lighting Rural Tanzania* project, reaching 100,000 people in remote areas of the country with improved access to lighting and energy services.

'opted in' to participate in the initiative (see 2013 and Beyond, below).

ESMAP also produced five country-level rapid assessment and gap analysis reports for SE4All



in FY2012—Bangladesh, Honduras, Indonesia, Laos, and Zambia. These reports cover all three SE4All goals (universal access, doubling of renewable energy, doubling of the rate of improvement in energy efficiency), and are intended to be a quick summary of the country’s energy situation within the context of its national economic and social development. The reports focus on the status of the countries in terms of the three goals, with a view to identifying the main opportunities and challenges—including policies and investments required—to meeting the goals. These assessments will serve as a background for future action plans that guide SE4All activities in these countries.

ESMAP also coordinated the development of SE4All fact sheets for 15 countries, and participated in high-level SE4All missions to Ghana, Kenya, Tajikistan, and Uganda.

### AFREA

Given its vast energy access needs, Sub-Saharan Africa is a major focus for ESMAP, and substantial work in this area is carried out through the **Africa Renewable Energy and Access Program (AFREA)**. Now in its fourth year, AFREA has achieved a number of accomplishments as it has piloted new approaches to expanding access to sustainable energy. Paramount among these approaches are innovations to expand electricity access, off-grid lighting, and clean cooking solutions. AFREA’s contributions have been recognized as part of the events marking 2012 as the International Year of Sustainable Energy for All.

**Lighting Africa**, a joint initiative of the World Bank and the International Finance Corporation (IFC), helps speed up the adoption of clean off-grid lighting technologies by households and businesses in Sub-Saharan Africa. The original





goal was to provide cleaner, more affordable lighting to 2.5 million people by 2012, and 250 million people by 2030. Already, figures show that over 4 million people without electricity access in Africa have in the last three years acquired modern, pollution-free lighting products for their homes and businesses through this program.

In the past two years, ESMAP support through AFREA has allowed Lighting Africa's World Bank-executed activities to expand beyond the pilot countries of Kenya and Ghana, to include Ethiopia, Tanzania, Democratic Republic of Congo (DRC), Nigeria, and Senegal. In FY2012,

sales of modern lighting products, most of them solar-powered, grew by 115 percent over the previous year.

Lighting Africa has signed up 14 manufacturers and distributors of off-grid lighting products to participate in this rapidly growing market. These companies manufacture and distribute 40 products that have passed Lighting Africa's Minimum Quality Standards, and are available on the African market. Lighting Africa was among the initiatives recognized and applauded at the Rio+20 Summit in June 2012 for its contribution and commitment towards the 2030 target of SE4All.



Modeled on Lighting Africa, the Lighting Rural Tanzania initiative has provided more than 100,000 people in remote rural areas in Tanzania with improved access to lighting and basic energy services, and demonstrated sustainable business models that can now be scaled up. In Liberia, the country's Rural Renewable Energy Agency (RREA) launched Lighting Rural Liberia in February 2012. This initiative aims to increase access to better lighting for millions of people who currently rely on polluting kerosene lamps and dry cell battery powered lights (see Box 3.1).

Important work was also conducted in FY2012 around biomass use in Africa. The **Biomass Energy Initiative for Africa (BEIA)** financed nine pilot projects in eight African countries which started to show results in FY2012. Small grants were given to NGOs, research, and private sector organizations to support innovation and develop scalable models for cookstoves, sustainable charcoal production, biofuels, and bio-electricity.

In Uganda, South Africa, and The Gambia, project work advanced to enable better market conditions for high quality and high performance modern cooking stoves. Among the pilot projects that matured in FY2012 was the Scaling up Biodiesel Production Project in Kenya, which is geared towards reducing the dependence of people living beside forests on wood fuel, conventional diesel, and kerosene (see Box 3.3)

In Rwanda and Tanzania, modernizing the charcoal industry was the main focus. The BEIA pilot Promotion of Charcoal Briquettes Project in 12 Tanzanian villages provided hands-on training in the production of non-wood

charcoal briquettes using locally available agricultural waste. The Rwandan Government aims to reduce dependence of biomass energy from the current 86 percent to 50 percent in 2020 and has applauded this project for its contribution to encouraging more efficient use of biomass.

Also in Rwanda, additional technical support was provided through AFREA to the government for sustainable use of biomass and clean cooking solutions, designing a policy framework for renewable energy, and to exploit Lake Kivu methane for power generation.

AFREA also continues to implement the **Gender and Energy Program**, which cuts across all of AFREA's work. Involving women in the design and implementation of modern energy access programs, and identifying ways to overcome barriers to credit or technology, has extended the benefits of electrification and enhanced cooking fuel supply within rural communities to both women and men.

In FY2012, rural energy agencies in particular were helped to integrate gender considerations into their work through research, training, and technical support. Tanzania this year confirmed the creation of a new gender focal unit, and a technical and capacity building unit within its rural energy agency to advance work in this area. In Mali, a gender focal point has been appointed at the national rural energy agency and a full gender and energy needs assessment has taken place.

In Senegal, gender concerns have been successfully integrated into an ongoing project, ensuring it is a core part of staff capacity-building

## BOX 3.1

### LIGHTING LIVES IN LIBERIA

For the people of Yandhoun in rural Liberia, the start of work on their dormant village micro-hydropower facility in 2012 has been a source of hope. After a lengthy feasibility study, the plant was selected as a priority pilot project for the country's new Rural Renewable Energy Agency (RREA), which was founded with support from AFREA. Operational before Liberia's civil war ravaged the country's infrastructure, the micro-hydropower plant is expected to be community managed to meet local demand and productive use.

Simultaneously, the RREA has launched its Sustainable Solar Market Facilitation program, modeled on Lighting Africa, to help develop a commercial market for renewable energy products while making such products more affordable to the rural market. This program will increase access to better lighting for millions of Liberians who still use polluting kerosene lamps and dry cell battery powered lights. The launch of this initiative in February 2012 served as a business-to-business matchmaking event that brought together eight international suppliers of off-grid solar lighting products and six local retail partners.

The Liberia program uses lighting products that have undergone and passed Lighting Africa's quality testing. One component is a lantern exchange effort, aimed at progressively replacing 100,000 kerosene lamps and dry cell battery powered lights by the end of 2015.

The "Lighting Lives in Liberia" activity will run to the end of 2012, and will be followed by a scaled-up phase across the country, expected to run for four years, which will be funded by the Global Environment Facility (GEF) and administered by the World Bank.

activities and project design elements, and drives key milestones like the inclusion of women in the profitable charcoal value chain from which they were largely excluded. Women are also now leading the local management of forestry committees as a result of the project. In addition, Agence Sénégalaise d'Électrification Rurale (ASER), the country's rural electrification agency, has officially adopted a gender program, acknowledging the transformative effect an electricity supply can have on women's lives. This work is being used as an innovation model for similar projects in Benin and Liberia.

Based on the experiences in five countries (Mali, Senegal, Benin, Tanzania, and Kenya), work is ongoing to develop toolkits, case studies, and knowledge materials to support the mainstreaming of gender considerations in energy projects.

AFREA was established in 2008 through a US\$28.875 million contribution by the Government of the Netherlands. Currently, all AFREA funds are allocated to activities, 90 percent of all resources are legally committed, and 67 percent of funds are disbursed. AFREA will close on June 30, 2014.

## BOX 3.2

### **ELECTRICITY LIFTS LIVELIHOODS, BOOSTS BUSINESS IN RURAL PERU**

Rural electrification follows a similar pattern in many countries. As electricity reaches a new community, it is immediately put to work for lighting and other household uses. Putting that power to use to develop rural enterprises and boost local incomes, however, often requires an extra effort. Since mid-2011, ESMAP has supported a World Bank project in Peru, carried out by that country's Ministry of Energy and Mines (MEM), to look at potential productive uses of electricity in rural areas, based on pilot projects under the national electrification program.

The Peru project adapted lessons learned from work done in Indonesia, contracting with NGOs and power distribution companies to provide business development services and promote productive uses of electricity at the local level. To date, the project is estimated to have helped 4,700 rural producers to adopt electrical equipment in existing or new businesses. These include agricultural processing, irrigation, dairy production, bakeries, metal processing, carpentry, ceramics, and textiles.

Early analysis shows that more than a third of the producers that benefited were women, who play a significant role in certain productive sectors (baked goods, dairy products, ceramics and textiles), and are represented in all areas. The project is expected to assist over 15,000 rural producers by its close in June 2013.

One of the important lessons of the work in Peru has been that rural electrification projects, if designed properly, can promote local development as well as expand energy access. Productive uses should be promoted in parallel to electrification efforts, and electricity distribution companies' business plans should address the productive use needs of local consumers.

### **Expanding South-South Knowledge Exchange in Africa**

As well as producing analytical work, another of ESMAP's core functions is to act as a knowledge clearinghouse, facilitating the sharing of global best practices on energy among policy-makers, experts, practitioners, and the World Bank. ESMAP expanded its knowledge exchange efforts considerably in FY2012, with a particular focus on Sub-Saharan Africa.

A conference of African energy ministers was held in Johannesburg, South Africa in

September 2011, to help take stock of the regional energy scenario prior to the 17<sup>th</sup> Conference of the Parties of the UN Framework Convention on Climate Change (COP-17) in Durban being held at the end of that year. ESMAP funded, and helped organize and plan the agenda for the meeting, which was hosted by the Government of South Africa. High-level officials from across the region, including ministers and deputy ministers, attended the conference, which focused on regional integration of transmission systems, scaling up renewable energy projects, and sustainable household

### BOX 3.3

#### **SCALING UP BIODIESEL PRODUCTION TRANSFORMS A COMMUNITY IN KENYA**

Traditional fuels, such as wood and charcoal, are still by far the prevalent sources of household energy for Kenya's rural population. When villagers in Naro Moru, almost 200 km from Nairobi, started processing croton tree seeds to make biodiesel, they did not realize the extent and speed with which it would transform their community and inspire a shift for others living in forested areas.

For the last two years, AFREA's Biomass Energy Initiative for Africa (BEIA) has provided grant funding to a local non-profit organization to help reduce dependence on wood fuel, conventional diesel, and kerosene. By promoting the use of biodiesel made from croton seed oil as alternative energy source at the household level, they have contributed to poverty reduction and environmental sustainability locally.

The local project around Naro Moru has generated employment opportunities for hundreds of individuals in direct seed collection, management of seed collection centers, transport of feedstock, direct employment in the grading and packing of seeds, and processing and marketing of biodiesel. Related income and employment opportunities include stove fabrication, commercial nurseries, and business development services.

To support reforestation, more than 20 nurseries, managed by women, continue to expand the seedling population and improve the efficiency of biodiesel production. Farmers have been trained through practical demonstrations on agroforestry, tree planting techniques, and management.

The biodiesel produced is readily purchased for use by public transport mini-buses, lorries, tractors, and generators because of its quality and competitive price. Through BEIA's support, the project has surpassed its business goals and scaled up biodiesel production from 300 to 1,000 liters per day, expanding the market for local producers and consumers.

energy solutions, and provided an early endorsement of SE4All.

The **Africa Electrification Initiative (AEI)**, a component of the AFREA program, serves as an ongoing community of practice that brings together energy ministries, rural energy agencies, utilities, research centers, and civil society to find common solutions to expanding access to electricity in Sub-Saharan Africa. AEI's online

platform now has over 200 expert users who share practical information about ground-level implementation of on-grid and off-grid electrification projects.

AEI's second regional meeting, held in Dakar, Senegal in November 2011, brought together more than 230 electricity practitioners from over 40 countries. The meeting focused on the experience of rural energy agencies and funds in the



region, many of which have been recently set up. Participants compared the agencies' and funds' approaches and identified early lessons from their operations. Some of the common challenges identified by participants in Dakar included creating low-cost technical solutions for grid extension, setting workable tariffs for rural electricity, improving the efficiency of hybrid mini-grid systems, and leveraging climate funds and carbon finance to improve access to electricity.

### Focusing on Cookstoves and Household Fuels

Indoor air pollution due to inefficient combustion of biomass fuels is estimated to cause 1.9 million deaths every year, mostly women and children, with millions more suffering from a range of health complications. Excessive use of biomass also leads to land and forest degradation and contributes to climate change. ESMAP continues to be deeply involved in work to disseminate improved cookstoves and fuels, and has contributed to a wide range of World Bank activities in this sector. ESMAP supported a flagship report by the East Asia and Pacific Region of the World Bank, "One Goal, Two Paths," that looked at ways to achieve universal access to clean and efficient cooking solutions in that region. A clean cookstove initiative is now underway in China, Indonesia, Lao PDR, Cambodia, and Mongolia.

In 2010, ESMAP joined with the Global Alliance on Clean Cookstoves (GACC) to promote clean cookstoves through regional initiatives in Africa, East Asia, South Asia, and Central America, to support the goal of reaching 100 million households with clean cookstoves by 2020. In FY2012, ESMAP and GACC commenced a study that maps



cookstove programs around the world to identify barriers currently preventing clean cookstoves and fuels from being adopted at scale, and to make recommendations to overcome those challenges using global best practices. That report, and an accompanying report on cookstove programs in Sub-Saharan Africa, will be published in mid-2013.

ESMAP and AFREA also undertook extensive consultations in Africa in FY2012, in preparation for the new **Africa Clean Cooking Energy Solutions (ACCES)** initiative, a market transformation program modeled on Lighting Africa, which will work to facilitate the enterprise-based scale up of clean cooking solutions in Africa. Three regional consultations were held, one each



for East, West, and Southern Africa, bringing together government, civil society, and private sector representatives from 26 countries. These consultations focused on specific interventions that could be taken to remove barriers to the expansion of simple, affordable clean cooking solutions in Sub-Saharan African countries.

In conjunction with the stakeholder consultations, ESMAP and AFREA also funded a landscape analysis of the African clean cooking sector. The goal of the study is to develop a comprehensive understanding of the household cooking sector and actors in Sub-Saharan Africa, including trends in fuel availability and use, cookstove technologies and markets, and consumer preferences. The landscape study and consultations have informed the design of ACCES.

### **Reaching the Urban Poor**

Rapid urbanization is putting new pressures on many developing countries to deliver reliable, clean energy services to growing populations in and around cities. This is especially true in slum areas and informal settlements that have long been characterized by a lack of modern energy services. In FY2012, ESMAP partnered with the Cities Alliance, a global coalition focused on reducing urban poverty, to host an extended dialogue on bringing modern energy services to the urban and peri-urban poor. The virtual consultation brought together over 100 experts from city authorities, local utilities, and civil society organizations from Africa, Asia, and Latin America, and included forums on electricity and household energy.

This dialogue culminated in a two-day face-to-face workshop during the ESMAP Knowledge

Exchange Forum in May 2012, held at the World Bank in Washington DC, where a number of innovative approaches to reaching poor communities were presented. In Brazil, AES Eletropaulo trained large numbers of local agents to conduct door-to-door outreach to poor communities to listen to comments and concerns, helping to reduce electricity theft and extend safe connections to 1.4 million households. The Indian NGO Shelter Associates combined community outreach and GIS technology to target specific slum locations for rehabilitation of energy services. In Kenya, Kenya Power substantially expanded the number of connections by installing simple technologies, such as pre-paid meters and outdoor connection boards, while extending credit to low-income consumers.

In parallel to the dialogue, ESMAP published a number of case studies of successful approaches to improving energy access to the urban poor, including examples from India, Bangladesh, Colombia, and Brazil. ESMAP and the Cities Alliance are now looking at ways of scaling up such approaches and introducing greater expertise on energy issues into national dialogues on city planning and slum rehabilitation. (See below).

## **2013 AND BEYOND | NEW INITIATIVES**

During FY2013, ESMAP's energy access program will continue to grow to meet expanding client needs, following the broad approach laid out as part of ESMAP's reorientation in FY2011, while also continuing to play a key role in supporting the global SE4All campaign.



A major new initiative in FY2013 in support of SE4All will be a technical assistance program for select client countries to help them develop investment prospectuses as part of national energy access plans. These plans will have clear goals, targets, and milestones that culminate in universal access by 2030, will be led by the countries themselves, and will build on the plans and programs already in place. Depending on the country, activities under this program may include:

- a detailed stocktaking to determine the country's current status, prospects, and gaps in achieving universal access to electricity and cleaner cooking/lighting, as well as a detailed mapping of energy demand;
- knowledge sharing with countries that have successfully overcome similar challenges, in order to strengthen the country's institutional and implementation frameworks; and
- expert advice on the policy and regulatory requirements to create a conducive

## HIGHLIGHTS OF NEW ESMAP-SUPPORTED ENERGY ACCESS ACTIVITIES BY THE WORLD BANK'S REGIONAL UNITS

### DIRECT DELIVERY OF POWER SUBSIDIES TO AGRICULTURE

In economies where agriculture is heavily dependent on irrigation, groundwater management and the electricity sector are closely intertwined. This nexus is particularly strong in South Asia due to unique political economy factors that influence policies in the electricity and the groundwater sectors. This study will review experiences of countries such as Mexico, Morocco, China, and Pakistan, to understand how financial incentives can be administered to use water and energy more efficiently. The output will be a global knowledge product of use not only for South Asia but also for other developing countries facing similar constraints.

### INDIAN NEWBORN STOVE TRIAL

Traditional cookstoves using biomass pose health risks to users, particularly pregnant and new mothers who inhale smoke from such stoves. This study will undertake a cluster-randomized trial in India to monitor the full health and other benefits of improved cookstoves for pregnant women. The goal is to see whether advanced biomass stoves with extremely low pollutant emissions could be provided to pregnant women during visits to public clinics for prenatal care that now cover a major part of the Indian population.

### PHILIPPINES RURAL ELECTRICITY COOPERATIVES | REFORM AND RESTRUCTURING

As the electricity supply industry in the Philippines undergoes reforms, electricity cooperatives must be creditworthy so that sufficient power generation capacity can be contracted to meet demand, and full electrification of the country can be achieved and remaining energy poverty issues can be addressed. The objective of this work is to assist the Government of the Philippines with development of a more robust framework for governance, management, and financial and operational improvement of electricity cooperatives. This activity is part of a larger program of strategic advice to the Government on critical issues in the power sector, in particular power generation development, public financial liabilities stemming from the power sector, and cost management and pricing issues.

environment for increased investment in energy infrastructure and improved energy service delivery.

In addition, ESMAP will provide significant support to the development of SE4All Global Tracking Framework, in partnership with the International Energy Agency, Global Alliance for

Clean Cookstoves, IIASA, IPEEC, IRENA, Practical Action, REN21, UN Energy, UN Foundation, UNDP, UNEP, UNIDO, World Energy Council, and World Health Organization. The Global Tracking Framework will provide a snapshot of the current picture on access, renewables and efficiency, and guide measurement of progress on the objectives to 2030. At present, starting



values for the reference year of 2010 can only be tracked using available national data for energy access, energy efficiency, and renewable energy generation. These data vary in their comprehensiveness and accuracy, and are not always sufficient to provide a reliable and consistent assessment of where the world stands in relation to the three objectives. The Global Tracking Framework addresses this challenge by recommending realistic improvements in global databases that could be achieved in the medium term of up to five years. The Global Tracking Framework also proposes how some of these issues could be addressed through country level tracking.

With the AFREA program wrapping up in FY2014, ESMAP and the World Bank's Africa Energy Group have laid the groundwork for AFREA's second phase—AFREA II. AFREA II will deepen and expand on the success of AFREA's first phase activities, especially regional initiatives like Lighting Africa, BEIA, ACCES, AEI, and Gender and Energy. In addition, AFREA II will build a tighter connection to World Bank lending to better leverage available funding. While AFREA I focused primarily on piloting innovative solutions, AFREA II will support their scale up, including mainstreaming pro-poor and clean energy approaches.

AFREA II will also increase support to improving policy frameworks and bolstering institutions, with special attention to the needs of post-conflict and fragile states. AFREA will support both grid-connected and off-grid renewables and all forms of energy access—grid expansion,

mini-grid, stand-alone systems, lighting, and clean cooking solutions.

Also in FY2013, ESMAP and the Cities Alliance will expand their partnership with a new program of analytical and advisory activities to address energy access to peri-urban communities and the urban poor. This program will support the inclusion of energy interventions in the preparation of the Cities Alliance's country programs. The emphasis will be on strengthening the linkages between energy efficiency in municipal services with energy access, and distributed generation with renewable energy. There are strong interlinkages between efforts to reduce energy intensity and the carbon footprint of cities and expanding access to modern energy services. Efficient lighting and appliances can help enhance the affordability of access to electricity, while renewable energy provides least-cost options for rapidly expanding urban and peri-urban energy needs.

ESMAP will continue to produce global knowledge products to underpin its energy access efforts, including an approach to defining and measuring access to energy, contributions towards a measure for energy poverty, an analysis of the economics of the household energy sector, and a resource paper on household energy, based on lessons learned and good practice in Bank and other projects. Starting in FY2013, ESMAP and the World Bank will produce a report on the state of global energy access that will provide an overview of progress towards universal access to modern energy services at the global and national levels.





## CHAPTER 4

# FOSTERING SUSTAINABLE, ENERGY EFFICIENT CITIES

Cities—particularly the rapidly expanding cities of the developing world—are engines of economic growth. They are also primary consumers of energy and emitters of pollution and GHG emissions. It is here where many of the biggest opportunities for energy efficiency can be found—in urban transport, building, public lighting, water utilities, power generation, and other sectors. To be successful, however, energy efficiency will require implementing both efficient technologies and measures to manage demand, such as urban planning to optimize traffic flows, consumer education, and improved industrial efficiency practices.

ESMAP launched the **Energy Efficient Cities Initiative (EECI)** in FY2009 to promote better-informed energy efficiency planning and programs in cities in developing countries. The initiative's clients are mayors and municipal bodies, and it is designed to be demand driven and responsive to their rapidly changing needs. For city governments, there are many benefits of integrating energy efficiency into municipal and sectoral planning: reduction of pressure on overburdened energy systems, an improved fiscal outlook, better service, and



greater flexibility in energy planning and in extending access to underserved populations.

Since EECI's inception, ESMAP has developed tools, guidance notes, and other knowledge products to help cities identify, design, and implement energy efficiency improvements. It has worked directly with cities to pilot innovative initiatives across sectors, and with World Bank regional operations units to identify and develop investment projects that integrate energy efficiency in the urban, transport, and water sectors. ESMAP has also fostered partnerships and information sharing with similar international programs and alliances, and developed a database of case studies that highlights urban energy efficiency success stories.

## FY2012 | HIGHLIGHTS AND ACHIEVEMENTS

### Identifying High-Yield Actions for Cities

Urban planners are faced with a wide and increasingly complex set of choices when it comes to improving citywide energy efficiency.

**The Tool for Rapid Assessment of City Energy (TRACE)** is a decision-support tool developed by ESMAP designed to help cities identify and choose among energy efficiency opportunities. It assesses six sectors—transportation, public lighting, buildings, power and heat, waste, and water and wastewater. TRACE includes an energy benchmarking module that compares a city's key performance indicators with those of peer cities. A sector prioritization module ranks energy savings potential of various sectors of a given city. From those, recommendations are generated for specific interventions.

### ACHIEVEMENTS IN FY2012 UNDER THE ENERGY EFFICIENT CITIES INITIATIVE

- Global deployment of TRACE, a decision-support tool developed by ESMAP to help cities prioritize energy efficiency options, with implementation in 12 cities in Asia, Eastern Europe, Africa, and Latin America.
- Publication of the report *Sustainable Low-Carbon City Development in China*, with detailed recommendations for Chinese municipalities on transport, buildings, land use, and water management.
- Completion of a study on efficiency in district heating in Ukraine, which has informed government policy-making and a US\$ 400 million World Bank operation.
- Publication of the *Primer on Energy Efficiency for Municipal Water and Wastewater Utilities*, which lays out efficiency measures that could lead to energy savings of 5 to 25 percent at utilities in developing countries.
- With the World Bank's Transport Anchor, PPIAF, and other partners, launch of the Leaders in Urban Transport Planning program, a worldwide training series that emphasizes a holistic approach to transport planning.

Implementation of TRACE has spread quickly since an initial deployment in Quezon City, Philippines in FY2010. Twelve cities—Banja Luka (Bosnia and Herzegovina), Belgrade (Serbia), Belo Horizonte





(Brazil), Cebu (Philippines), Da Nang (Vietnam), Gaziantep (Turkey), Prishtina (Kosovo), Quezon City (Philippines), Sarajevo (Bosnia and Herzegovina), Skopje (Macedonia), Surabaya (Indonesia), and Tbilisi (Georgia)—are now using TRACE (up from five in FY2011) to make decisions about their energy efficiency planning. The tool has proved popular because it enables planners to quickly prioritize under-performing sectors and identify immediate actions.

The deployment of TRACE is already informing policy and World Bank lending. TRACE work in Turkey helped define the sustainable cities pillar in that country's Country Partnership Strategy for the years 2012 to 2015. In Skopje, Macedonia, findings from a TRACE deployment fed into the national Green Growth Agenda and informed World Bank investments in municipal infrastructure. In Tbilisi, Georgia, TRACE contributed to the development of the Georgia Municipal Development Fund. In Indonesia, TRACE was used to create city-level case studies,

the results of which are being used to create sustainable urban energy program guidelines for cities across East Asia. The most recent city to implement TRACE is Belo Horizonte, Brazil (see Box 4.1).

### **A Focus on Energy Efficiency in the Water and Transport Sectors**

ESMAP's global analytical work through EECI focuses on topics of growing importance to clients, and emerging areas where significant efficiency gains can be had.

One of these areas is municipal water and wastewater services, where efficiency measures could result in substantial energy savings. Electricity costs are usually between 5 to 30 percent of total operating costs among water and wastewater utilities. In February 2012, ESMAP published a primer on energy efficiency at water utilities that demonstrates the importance of energy efficiency in controlling costs and expanding clean water access to the poor. The primer focuses on the supply side

of the municipal water cycle, including the extraction, treatment, and distribution of water, and collection and treatment of wastewater.

The case studies covered by the primer indicate that financially viable efficiency measures could lead to savings of between 5 and 25 percent of the energy used by water utilities in developing

#### BOX 4.1

### **BRAZIL'S "BEAUTIFUL HORIZON" LOOKS TO CITY-WIDE IMPROVEMENTS IN ENERGY EFFICIENCY**

The city of Belo Horizonte, Brazil, is determined to be known for its commitment to sustainability. In recent years, the municipal government has switched public lighting to a more efficient system, conducted a GHG inventory, and created programs for sustainable public purchasing and building certification. The city prides itself on its public parks and on having twice the green area inside the municipal boundaries than is recommended by World Health Organization guidelines. The name of the city itself means "Beautiful Horizon."

As these sustainability initiatives progressed, authorities recognized that more could be done to improve the city's energy efficiency. To help decide where to best allocate resources, Belo Horizonte has partnered with the World Bank to become the first city in Latin America to implement TRACE. Working directly with the Belo Horizonte municipal government and utilities for three months in early 2012, an ESMAP team conducted an assessment of energy used by the city and proposed recommendations in the key sectors. The results contained some surprises.

Compared to other cities, there were not many efficiency savings to be found in Belo Horizonte's power sector, as technical and commercial losses were already some of the lowest in the world, and the local power utility invests the equivalent of US\$ 28 million towards efficiency every year. Though the city has an efficiency program for buildings, the TRACE analysis found that a centralized unit with a mandate to implement specific measures could lead to increased energy savings.

Some of the greatest potential gains were to be found in the transport sector, by integrating the numerous plans and projects already underway and putting traffic flow optimization in place. Another target area was the water utility, where an active loss detection system could minimize the losses from leakage. The assessment also recommended that the city streamline the routes taken by garbage trucks to reduce the resources spent moving waste to landfills.

The recommendations of the TRACE assessment were presented to the City of Belo Horizonte at the 2012 ICLEI World Congress—a major gathering of local government officials from around the world—which was held in Belo Horizonte on June 14-17, 2012. ICLEI—Local Governments for Sustainability—is a global association of national, regional, and municipal governments that have made a commitment to sustainable development. The Congress in Belo Horizonte brought together 1,600 participants and focused on creating low carbon, biodiverse cities built around people.

countries. This study has since been used to advise the national water utility for Uruguay on efficiency and sustainability measures.

In transport, while large-scale mass transit systems have gained considerable attention and investment in recent years, traditional city bus systems—which often transport the majority of the urban poor—have a lower profile. Many cities in the developing world are dominated by old and fuel-intensive buses with high operating costs. ESMAP published a guidance note in late 2011 that provides detailed and practical recommendations on how city bus operators can maximize fuel economy and improve their fleets through operations and maintenance practices, without significant capital investments.

ESMAP's focus on urban transport continued in 2012 with the launch of the Leaders in Urban Transport Planning program, a series of training events led by the World Bank's Transport Anchor, designed to help the next generation of urban transport planners make informed decisions in a highly complex environment. Events have already been held in Singapore, Nigeria, China, and France (see Box 4.2).

### **Harnessing the Potential of Procurement**

Public procurement presents another opportunity for large-scale efficiency gains that is only just now being appreciated. Governments on average account for 2 to 5 percent of national energy use, and this can rise to 20 to 30 percent in countries with high heating demand or low electrification rates. Between 12 and 20 percent of a country's GDP passes through public procurement systems. Government actions influence private sector purchasing and individual decision-making, and

government-approved technical specifications send signals to suppliers about the types of goods and services that will be in demand.

ESMAP published a guidebook in FY2010 on public procurement of energy efficiency *services* that laid out measures governments can take, including energy savings performance contracts, to lead by example and influence markets. This focus continued in FY2012 with follow-on work on public procurement of energy efficient *products*. A series of case studies were developed looking at cities and countries with well-established energy efficiency purchasing programs. These detailed the models available to governments, including product labeling, a catalog of technical specifications, life-cycle costing, and preferential treatment in procurement. The case studies demonstrated that while some efficient goods have slightly higher costs, the reduction in energy expenses and longer product lifetimes make them more cost-effective in the long run.

The findings of this work were presented at a workshop in June 2012, attended by experts and purchasing officials from Mexico, Brazil, China, Thailand, Russia, and India. Together with the earlier work on procurement of energy efficiency services, these findings will form the basis of a guidance note for mayors in FY2013, and have informed the team in charge of updating the World Bank's procurement policies and guidelines.

### **Emerging Opportunities around the World**

As well as producing knowledge products with global applications, ESMAP also supported



## BOX 4.2

### SUPPORTING THE NEXT GENERATION OF URBAN TRANSPORT PLANNERS

Developing-country cities are faced with traffic congestion, rising transport costs, deteriorating road safety and increasing pollution and GHG emissions. Some cities have tried to improve the situation by widening roads and building flyovers, but in most cases traffic growth and congestion have accelerated. Others have built high-cost mass transit systems but left poor-performing surface bus and rail systems untouched.

It is increasingly clear that piecemeal fixes will not work. A new approach to urban transport planning is needed that takes into account both supply- and demand-side measures, and integrates recent developments in environmental planning, energy efficiency, and climate change. For the past year, this comprehensive approach has been the focus of a series of training events held around the world and targeted to the next generation of urban transport leaders. This “Leaders in Urban Transport Planning” program is supported by ESMAP, the World Bank’s Transport Anchor, the Public-Private Infrastructure Advisory Facility (PPIAF), AusAID, AFD, and other partners.

The first pilot training was conducted in Lagos, Nigeria, in mid-2011. The first formal training event was held in Singapore in January 2012, drawing 60 transport administrators and planners from 13 countries. Workshops were also held in Marseilles, France, and Fuzhou, China, both in June 2012, and in Ahmedabad, India, in July 2012. The face-to-face events are preceded by a month of self-paced learning using specially designed self-study modules. The emphasis of the events themselves is on case analysis, group exercises, and site visits, with presentations kept to a minimum.

In Fuzhou, the event brought together 50 participants from 12 Chinese cities. China has over 100 metropolitan areas with over 1 million inhabitants, and is expected to have a critical need for trained urban transport planners in the future. In Ahmedabad, the Secretary of the Ministry of Urban Development closed the event, which brought together 33 participants from state and city governments, bus and rail agencies, and development authorities.

In FY2013, Leaders in Urban Transport Planning sessions will be held in Korea, China, Argentina, Morocco, and Mexico.

targeted energy efficiency work in countries around the world.

In China, where cities are expected to add 350 million residents in the next 20 years, urban areas are at the center of national efforts to reduce

energy intensity. An ESMAP supported report, *Sustainable Low-Carbon City Development in China*, published in May 2012, recommends action on multiple fronts. The report emphasizes the importance of decisions affecting land use as the built environment is largely irreversible and very



costly to modify once cities grow. Other recommendations include the need for energy-efficient buildings; a transport system that offers alternatives to automobiles; and a shift to efficient management of water, wastewater, and solid waste. The report also explores cities' role in climate adaptation, and opportunities presented



by carbon finance and other global mechanisms to support low carbon city development in China.

In Ukraine, an ESMAP study on modernization of district heating released in March 2012 demonstrated the need for consumption-based billing, heat metering and increased investments to ensure financial sustainability and improved quality of service. The study was presented at workshops around the country, and contributed to a national debate on improving the efficiency of the heating sector. The Government of Ukraine has now approved a master plan that includes cost-recovery tariffs, a large-scale investment program in energy efficiency measures, and reforms of the social safety net

to protect vulnerable consumers. The World Bank is assisting with the implementation of this master plan through an ongoing policy dialogue and a planned US\$ 400 million district heating energy efficiency investment project.

In Afghanistan, the recommendations of an ESMAP study begun in FY2009 on energy savings opportunities in large buildings have been incorporated into the National Energy Efficiency Policy and Work Plan. The Ministry of Energy and Water has created an energy efficiency team and has started implementation of an efficient lighting initiative for government buildings.

## 2013 AND BEYOND | NEW INITIATIVES

ESMAP will continue to support informed decision making at the city level, dissemination of best practices on urban energy efficiency, and world-class analytical work through EECI. Going forward, areas of focus will include:

**Expanded outreach to cities by fostering partnerships with international organizations and alliances.** This will include working with organizations such as the C-40 and ICLEI to reach out to their memberships with training, knowledge sharing, and technical assistance. This may also include preparation of pilot projects and scalable solutions, particularly those suggested through TRACE deployments, which could be financed through the World Bank or other international financial institutions.

**Further deployment of TRACE and development of decision-support tools and guidelines for**



**cities.** Demand for TRACE continues to grow, with new implementations starting in Colombo and Rio de Janeiro. ESMAP will continue to support TRACE deployments worldwide with a view to collecting best practices and solutions that can be replicated. TRACE itself will also be upgraded with improved efficiency benchmarking indicators and an expanded database.

Development will also start on a diagnostic tool to prioritize urban transport investments, along with a guidance note for mayors and guidelines for urban transport.

**Scaled up support for municipal water and wastewater operations, as well as urban transport.** The initial targets will be the Latin

## BOX 4.3

### HIGHLIGHTS OF NEW ESMAP-SUPPORTED ENERGY EFFICIENCY ACTIVITIES BY THE WORLD BANK'S REGIONAL UNITS

#### CHINA | ENERGY EFFICIENCY IN GOVERNMENT FACILITIES

Due to China's size, its efficient use of natural resources is also critical for sustainable development globally. The project will be undertaken as a part of the World Bank's ongoing efforts to support China in improving energy efficiency, creating entry markets for energy-efficient products and services. This activity will be the initial step toward building a support platform for energy efficiency in government facilities. It is likely that programs developed at the central level will be considered by similar provincial and municipal level departments; therefore, the potential for policy leverage is very high.

#### TUNISIA | GHG MITIGATION ACTION PLAN IN TRANSPORT SECTOR

The objective of this activity is to assist the Government of Tunisia in implementing some of the measures recommended by the Low Carbon Transport Strategy developed with the ESMAP support in 2009-10. These measures aim at reducing the GHG emissions and the fossil energy consumption of Tunisia's land transport sector. Priorities from the strategy include: reducing transport demand in urban areas; reducing the share of individual car transport; optimizing land transport of freight; promoting more efficient interurban transport of passengers; and improving technology of vehicles.

#### UKRAINE | FACILITATING COMMERCIAL MUNICIPAL ENERGY EFFICIENCY FINANCE

This activity will facilitate financing of energy efficiency investments by municipalities, municipal utilities, energy service companies, international financial institutions, and commercial banks. This will help the Government of Ukraine to reach its strategic objective to reduce energy intensity by 20 percent by 2015. The activity will help identify and address legal and regulatory obstacles to municipal energy efficiency finance, build government capacity by developing and applying commercial and international financing models to municipal energy efficiency projects that can be scaled up, and inform World Bank lending for municipal energy efficiency projects.

America and the Caribbean region, and the Europe and Central Asia region, where rehabilitation of urban water and wastewater infrastructure is a priority. Discussion is underway with the regional water and sanitation team to develop an operation support platform to

maximize ESMAP leverage and foster knowledge exchange among the many client countries that face similar technical and/or institutional challenges. Support to the Leaders in Urban Transport Planning program will continue, with training events scheduled throughout FY2013.







# DEVELOPING EFFECTIVE ENERGY SECTOR POLICIES, PRACTICES, AND INSTITUTIONS

**E**SMAP has been well known for many years for direct, targeted assistance to governments to help them review, design, and implement energy policies; develop and strengthen institutional capacity; and improve the performance of their energy sectors. ESMAP's **Energy Assessments and Strategies Program (EASP)** leads the bulk of these efforts, working with countries and regions to assist them in their efforts towards developing robust, sustainable energy sectors.

Most ESMAP activities in this program are implemented by the World Bank's regional energy units through ABG funding. Focus areas include: energy sector performance, governance, and planning; energy reliability and security; regional energy trade; private participation and market structure; and regulatory and policy frameworks. ESMAP's work in this area is designed to take good practices and policies from around the world and adapt them so they can

be applied to specific national and regional contexts. This program also develops modeling tools and toolkits that can be used by energy planners to support decision making in sometimes highly complex environments.

This targeted assistance has had a measurable impact on World Bank operations. ESMAP's most recent portfolio review estimates that between FY2009 and FY2012, 69 completed activities under EASP, representing about US\$ 15 million in program allocations, influenced a total of US\$ 6.9 billion in World Bank Group lending.

## FY2012 | HIGHLIGHTS AND ACHIEVEMENTS

### META | Assessment of Electricity Supply Options

Decisions about electricity planning are becoming increasingly complex, due to the pace of technological change, rapid shifts in equipment and fuel prices and the ever-expanding availability of data. To help electricity policy-makers and planners select the most appropriate electricity generation options, ESMAP launched the **Model for Electricity Technology Assessment (META)** in FY2012, as part of its work on global energy planning tools.

META provides a comparative assessment of the levelized costs for a range of electricity supply options, including renewable energy. The model takes into account changes in capital and operating costs over time, as well as transmission and distribution options. One of the advantages of META is that it covers a comprehensive range of technologies, ranging from solar, wind, and

## ACHIEVEMENTS IN FY2012 UNDER THE ENERGY ASSESSMENTS AND STRATEGIES PROGRAM

- Launch of the Model for Electricity Technology Assessment (META), which will allow national policymakers and utility planners to compare levelized generation and delivery costs over a comprehensive range of power generation options, including renewables, while taking into account environmental externalities.
- Background paper with recommendations on policies for increasing access to energy services, part of the ESMAP-supported India Power Sector Diagnostic Review, used as an input for preparation of India's 12<sup>th</sup> Five-Year Plan.
- Wide dissemination of the report *Mitigating Vulnerability to High and Volatile Oil Prices: Power Sector Experience in Latin America and the Caribbean*, with lessons presented to governments in the Pacific islands, as well as the Latin American and Caribbean region.
- Support to a comprehensive study on the policy and regulatory framework needed to develop robust cross-border electricity trade in the Middle East and North Africa, conducted in collaboration with the League of Arab States.
- Measures taken by the Government of the Maldives to strengthen the national energy regulatory body following an ESMAP-supported project to help the Maldives reduce dependence on diesel-powered electricity and move towards carbon neutrality.



geothermal, to fossil fuel-based power. Users can look at options categorized by scale: off-grid, mini-grid, and grid-connected. The model is able to incorporate environmental externalities, such as costs for local pollution and carbon emissions.

META was launched at a workshop at the World Bank in Washington DC in June 2012. The META model is now available for use by client countries, researchers, consultants, and other stakeholders upon request, as well as by World Bank teams as part of engagement with countries on energy issues. A number of teams and consulting firms have begun using the tool in their work. Feedback from those users is being incorporated into the model in preparation for it being updated and made more widely available.

### **Policy Dialogue and Power Sector Support in South Asia**

In 2012, EASP continued its support to in-depth policy work in the South Asia region. The South

Asia Regional Electricity Study Series (SARESS) of papers was launched in FY2011 to provide focused knowledge pieces to examine a specific set of related policy questions in the areas of improving operational and financial performance of the energy sector; and strengthening governance to improve the contribution of energy to equitable economic development. The work under this initiative has clear operational links that aims to enrich the World Bank's dialogue with client governments, and to inform ongoing work on electricity in South Asia.

SARESS has been completed, with 18 analytical pieces delivered. Topics have included the distributional impact of electricity tariff changes in Nepal and Bangladesh; the cost of rural power supply in South Asia; least cost expansion study for Bangladesh; and lessons from international experience for the regulation of renewable energy in India. In many cases, these papers have been tailored and delivered to help inform specific client decisions. This approach has allowed for



a strengthened dialogue between the World Bank and clients.

SARESS work in India was designed to complement another ESMAP-supported activity, the India Power Sector Diagnostic Review, which is still ongoing. This activity is a comprehensive stocktaking of India's power sector, covering access levels and challenges in improving access to energy, the financial and operational performance of the sector, and corporate governance in power sector utilities. Outputs from this work have already had an impact. The background paper on energy access, prepared as part of the review, provides recommendations on policies for increasing access to modern energy services, and has been used as an input for preparation of India's 12<sup>th</sup> Five-Year Plan.

### **Power Integration in the Middle East and North Africa**

ESMAP has supported a comprehensive and ambitious study on potential electricity integration in the Arab World. This work, undertaken by the World Bank's Middle East and North Africa Region in collaboration with the League of Arab States, is the final step in a three-part program focusing on electricity interconnection, electricity-gas trade potential, and policy and regulatory frameworks necessary for integration.

Among the topics that this study covered are the development of required governance regulations, such as a regional grid code; general regional electricity market agreements; identifying barriers to efficient energy trading among the concerned countries; defining the legal support required for a competitive and efficient regional

energy market; and proposing an action plan for development of integrated regional markets.

Recognizing the diversity of national and sub-regional systems in the region and the varying pace of reform processes, the study presents detailed recommendations for moving towards long-term electricity integration in the Arab World and with neighboring regions through a number of intermediate stages. Short- and medium-term recommendations include identifying immediate trade opportunities, and establishing regional regulatory and transmission system operations committees. The final report of the study has been delivered to the League of Arab States and is expected to be published in 2013.

### **Helping Mitigate the Risks from High and Volatile Oil Prices**

World oil prices have risen substantially in the last decade—since 2002, the price of oil has increased more than fivefold. In the period since prices reached their peak in 2008, ESMAP has been helping countries manage their energy sector's responses to oil price volatility. The latest work in this series focuses on the experience of the power sector in Latin America and the Caribbean, where some countries are acutely vulnerable to oil price shocks.

*Mitigating Vulnerability to High and Volatile Oil Prices*, published in early 2012, follows on from earlier ESMAP-supported work done in South Asia and Europe and Central Asia, exploring potential government actions to strengthen the resilience of the power sector to financial and market shocks. The report, which highlights the particular vulnerability of Central American



and Caribbean nations to high and volatile oil prices, offers a menu of complementary measures to increase resilience. In the short term, market-based risk management solutions (physical and financial instruments), such as forward contracts and futures, can be used to manage oil price risk. In the long term, more

potential for natural gas use as an alternate fuel source aimed at helping reduce their vulnerability to high and volatile oil prices. Another related study, which aims to assess the impact of sustained high oil prices on the energy sector in Latin America and the Caribbean, is expected to be completed in FY2013.



structural measures, such as investment in renewables, efficiency measures on both the generation and demand side, and regional integration, can help decrease dependence on oil and oil-derived products.

The report has been widely disseminated in Latin American and Caribbean countries. Additionally, the findings of the report were used to advise governments in the Pacific, where small island developing states share many similarities with their Caribbean counterparts, including an acute vulnerability to oil price increases (see Box 5.1). Recently, Central American governments have requested World Bank technical assistance in identifying the

## 2013 AND BEYOND | NEW INITIATIVES

With demand from client countries growing for targeted energy sector technical assistance, ESMAP's Energy Assessments and Strategies Program will continue to support work in its core focus areas of governance and regulation, sector strategy and planning, and energy security. Most of this work will be conducted by the World Bank's regional units through the ABG process, while initiatives that are global in nature will be undertaken by the core ESMAP team. These initiatives include:

**Full deployment of META.** META will be updated and adapted over the coming year based on global user feedback and operational experience. Once it has been field tested, META will be made available on the ESMAP web site and integrated into ESMAP's suite of tools that includes TRACE, EFFECT, and MACTool. Training and support on implementing the META tool will be made available to clients as they make decisions about their electricity strategies.

**Report on international experience with private sector participation in power grids.** In response to demand from regional clients, ESMAP launched a study in late FY2012 on different approaches



## BOX 5.1

### **MANAGING OIL PRICE VOLATILITY | BRINGING LATIN AMERICA'S LESSONS TO THE PACIFIC**

It is well understood that climate change poses specific dangers for small island developing states. Less commented on is another threat: the vulnerability of these states to the repercussions of energy insecurity.

Pacific islands are some of the most vulnerable. Spread out over a huge expanse of ocean, pooling power among countries is not the option that it is for other regions. Lacking fossil fuel resources, many of these states are forced to import oil products over long distances. When prices spike, these countries are among the hardest hit.

Global oil prices have now been volatile for 10 years, and the World Bank has been engaged with developing countries to help them manage and mitigate this volatility so that it does not hamper development or the extension of energy services to poor communities.

The Pacific islands share this vulnerability to oil price volatility with other regions of the world, particularly the Caribbean. In June 2012, one of the authors of *Mitigating Vulnerability to High and Volatile Oil Prices: Power Sector Experience in Latin America and the Caribbean*, traveled to the Pacific to share the findings and recommendations of that ESMAP report with officials from island states. This included a regional workshop in Fiji and a subsequent advisory meeting with officials in Tonga.

Three options were presented: (a) exploring available renewable power generation options, (b) increasing investments in energy efficiency both on the supply and demand sides, and (c) using financial hedging instruments to mitigate petroleum price risk.

Many Pacific islands are rich in sun and wind, and with the price of solar PV panels coming down considerably, solar power has become a more realistic option for some countries. But in the near term, these options may not be sufficient to supplant fossil fuel-powered generation. To mitigate costs, power must be generated and consumed much more efficiently. This can take the form of retrofits to ageing oil-fired power plants and reconfiguring supply and distribution configurations on the supply side, and through smart metering and programs that encourage efficient consumption on the demand side.

**IMPROVING THE INSTITUTIONAL FRAMEWORK FOR ENERGY IN THE MALDIVES**

The Maldives has announced its intention of becoming a carbon neutral country by 2020. The challenges inherent in reaching that goal are considerable. The country depends heavily on imported fossil fuels to meet its energy and transport needs. The electricity sector runs almost entirely on imported diesel fuel. And the geographic dispersion of the country means there is no national grid.


A 2010 World Bank project, funded by ESMAP, set out to support the Maldives in its goals of reducing dependence on diesel-powered electricity and moving towards carbon neutrality. The activity was focused on helping the government develop and implement a robust regulatory regime for the energy sector. At the time the work started, the government had only a small unit devoted to regulating energy within the Ministry of Housing and the Environment, the Maldives Energy Authority (MEA), which had a hard time clearly executing its mandate due to resource constraints. Before the regulatory architecture could be improved, the foundation—the regulator itself—had to be strengthened.

The team working on the project carried out a study of the current sector and the obstacles the MEA was facing to find what it would take to achieve efficiency and economy of scale by comparing regulatory bodies from other countries similar to the Maldives. A skills gap analysis was also conducted to see where technical capacity would need to be increased within the MEA. An interim report was delivered to the government in early 2011 with two options: (a) to strengthen the existing MEA as a stand-alone body responsible for all energy regulation, or (b) to set up a combined authority merging two or more regulatory bodies together.

In March 2011, the government expressed its desire to move forward with the first option, and use the existing MEA to focus solely on the energy sector. One of the primary reasons for the decision was the need to develop the energy sector to meet national development goals. A single-sector regulator, it was felt, would have the credibility and focus to meet this mandate. Once the decision had been made on the MEA's authority, the project could continue with a wider scope, focusing on a comprehensive framework for energy sector regulation.

The final result presented to the government in 2012 was a comprehensive set of draft regulations for licensing of electricity operators, procedures for investment approvals, utility performance standards, and an institutional development plan for the MEA. The recommendations emphasize the paramount importance of safety and network security, and call for regulations that promote investment, are suited to the geographic spread of the country, and that institute standards and compliance while not putting an undue burden on suppliers.





to private sector participation in electricity transmission and distribution grids, and the design and implementation challenges of open access to transmission and distribution systems. These two areas are receiving attention from policy-makers in the developing world, on account of the substantial investment needs in transmission and distribution, and the growing need to enhance the efficiency of the power sector. This work draws on lessons gained from international experience in these areas, along with a closer look at the progress on private participation and open access in five key countries—Brazil, Peru, Turkey, India, and the Philippines. The outputs of this study are expected to assist other countries that are looking toward private participation and increased open access as necessary factors for improving the efficiency and reliability of their power sector.

**Study of electricity sector planning in an era of increased risk.** The role of system planning and planners is evolving as private sector participation increases, electricity markets develop and as countries begin focusing on low carbon development. In parallel, the range and scale of risks that power sectors have to handle has expanded. To support development of a robust electric power infrastructure, planning needs to take account of system risk and mitigation to get a clearer picture of real costs and benefits.

Emerging considerations include fuel price volatility, social and environmental costs and benefits, the risks inherent in new technology, and financing risks. This work will review the experience of various countries that went through unbundling and reform and how they adapted their electricity system planning approach, the institutional mechanism they chose, how they dealt with risks, and how they integrated their electricity planning with broader national-level low carbon development plans.

**Assessment of options for safeguarding the poor from potentially adverse impacts of gas and electricity sector reforms.** Several countries struggle with electricity tariffs that are well below cost-recovery levels, while facing large investment needs and strong growth in demand. It is also becoming clear that subsidized tariffs distort incentives for energy efficiency and renewable resources, and impose a fiscal impact on the government. While such pricing reform is critical, there is also a need for social support mechanisms to safeguard the welfare of the poor and the vulnerable. Based on feedback from the Bank's regional energy teams, ESMAP will commence a study to assess policy and institutional options for safeguarding the poor and vulnerable from adverse impacts of tariff increases. This study will also look at impacts and mitigation measures in a gender-disaggregated manner.



## HIGHLIGHTS OF NEW ESMAP-SUPPORTED ENERGY ASSESSMENT AND STRATEGIES ACTIVITIES BY THE WORLD BANK'S REGIONAL UNITS

### ARMENIA | POWER SECTOR TARIFF STUDY

In order for Armenia to ensure adequate power supply and increase energy security, substantial new investments in power generation, distribution, and transmission will need to be made. The objective of the study is to assess the levels of current electricity tariffs in terms of cost recovery, and recommend an optimal tariff structure in order to ensure efficient use of electricity. During the process, the study will estimate the average tariff level reflecting total costs of efficient provision of electricity services to customers, review the existing end-user tariff structure and recommend improvements, and assess the long-run marginal cost of supply to end-users. The study will also assess the impact of price increases on the poor, and identify suitable means to mitigate these impacts.

### SYNCHRONIZATION OF THE MASHREQ POWER GRIDS WITH TURKEY AND ENTSO-E

Mashreq countries have undertaken tremendous efforts to improve the security of electricity supply and meet the fast growing demand. But despite existing physical cross-border interconnections, Mashreq countries' investments have generally been dedicated to maintain and develop their domestic power grids. The successful synchronizing of Turkey's power grid with Continental Europe offers an opportunity for the Mashreq countries to revamp their commitments for an ultimate synchronization with the European Network for Transmission System Operators for Electricity (ENTSO-E). The objectives for this study are twofold: to evaluate the status quo of existing interconnections and the potential for realizing the mutual benefits from synchronization with ENTSO-E; and to assess the technical and investment requirements to integrate the power grids of Mashreq countries with Turkey and ENTSO-E Synchronous Area over the long term. In doing so, the study will look at the investments and governance/regulatory reforms required to strengthen the domestic power sectors of different Mashreq countries, along with the interconnection requirements across countries.

### PERU | ENERGY PLANNING TECHNICAL ASSISTANCE

While Peru has an orderly energy sector that in general has been successful in attracting private investment, it lacks a central body to conduct sector-wide planning as a means of safeguarding long-term supply security. The objective of this activity is to provide technical advice to support the ministry in improving capacity by evaluating and designing a planning unit for the energy sector within the ministry. Technical experts supported by ESMAP will join with public and private sector experts on a high-level committee set up by the government to examine institutional options for sector planning. The committee will review the experiences of other countries that are at similar stages of advanced power sector reforms, such as Brazil and Colombia.







## CHAPTER 6



# FINANCIAL REVIEW



## CONTRIBUTIONS RECEIVED

ESMAP received a total of US\$ 23.3 million from donors in FY2012. Total receipts included Denmark's contribution of US\$ 7.1 million for the SIDS DOCK Multi-Donor Trust Fund (MDTF).

Eight donors, in addition to the World Bank, made cash transfers to ESMAP through the ESMAP Core MDTF and the SIDS DOCK Program MDTF in FY2012. Table 6.1 shows actual receipts from individual donors for the period FY2009–12 and receipts and pledges for FY2013.

TABLE 6.1

### ESMAP Funding for Strategic Business Plan FY2008–12 and Receipts / Pledges FY2013 (US\$ Thousands)

| Country            | 2009          | 2010         | 2011          | 2012          | 2013         |               | Total Receipts 09–12 | %           |
|--------------------|---------------|--------------|---------------|---------------|--------------|---------------|----------------------|-------------|
|                    |               |              |               |               | Receipts     | Pledges       |                      |             |
| Australia          | —             | 453          | 1,067         | 3,030         | 3,025        | —             | 4,550                | 4.9%        |
| Austria            | 588           | 424          | 2,680         | —             | —            | —             | 3,692                | 4.0%        |
| Canada             | 396           | 100          | —             | —             | —            | —             | 496                  | 0.5%        |
| Denmark            | 1,762         | 1,849        | 3,913         | 9,111         | —            | 2,113         | 16,635               | 17.9%       |
| Finland            | —             | 741          | —             | —             | —            | 787           | 741                  | 0.8%        |
| France             | 885           | —            | —             | 844           | —            | —             | 1,729                | 1.9%        |
| Germany            | 4,801         | 2,185        | 1,993         | 3,350         | —            | 1,312         | 12,329               | 13.3%       |
| Iceland            | 300           | 200          | —             | 300           | —            | —             | 800                  | 0.9%        |
| Lithuania          | —             | —            | 27            | —             | 33           | —             | 27                   | 0.0%        |
| Netherlands        | 23,890        | —            | 11,286        | 2,900         | 2,900        | 2,900         | 38,076               | 41.0%       |
| Norway             | 750           | 750          | 839           | 853           | —            | 1,759         | 3,191                | 3.4%        |
| Sweden             | —             | —            | —             | 2,311         | 708          | 1,471         | 2,311                | 2.5%        |
| United Kingdom     | 4,615         | 1,961        | —             | —             | —            | 6,485         | 6,575                | 7.1%        |
| World Bank         | 280           | 437          | 272           | 645           | —            | 300           | 1,634                | 1.8%        |
| <b>Grand Total</b> | <b>38,268</b> | <b>9,100</b> | <b>22,077</b> | <b>23,343</b> | <b>6,666</b> | <b>17,127</b> | <b>92,787</b>        | <b>100%</b> |

Notes:

- Actual receipts for fiscal 2009 and fiscal 2011 from the Netherlands and the United Kingdom include contributions made to ESMAP's Multi-Donor Trust Fund for the Clean Energy Investment Framework (CEIF), which includes the AFREA Program.
- ESMAP received US\$ 7.1 million from Denmark in FY2012 for the SIDS DOCK MDTF.
- Japan has pledged US\$ 15 million towards the SIDS DOCK MDTF to date.



## DISBURSEMENTS

Disbursements in FY2012 totaled US\$ 16.9 million, a decrease of US\$ 1.25 million from disbursements in FY2011. Part of this decrease was attributable to the completion and wrap-up of a number of special ESMAP programs in FY2011, such as the adaptation to climate change and low carbon growth studies. Additionally, in the Middle East and North Africa region, events related to the

Arab Spring delayed a number of projects, while in the Latin America and Caribbean region, a shift in client priorities led to a number of projects being extended or re-allocated.

Table 6.2 shows ESMAP disbursements by fiscal year, with project costs broken out for each region and for ESMAP's global program. Program management and administration costs are broken out by category.



TABLE 6.2

## ESMAP Disbursements, Fiscal Years 2010–2012 (US\$ Thousands)

|  | FY10             |             | FY11             |             | FY12             |             |
|--|------------------|-------------|------------------|-------------|------------------|-------------|
| Project Cost   | 18,569.26        | 90%         | 16,211.90        | 89%         | 14,867.81        | 87%         |
| Africa   | 4,045.70         |             | 6,317.98         |             | 6,915.75         |             |
| East Asia  | 1,365.88         |             | 934.69           |             | 517.91           |             |
| Europe & Central Asia  | 1,350.60         |             | 537.59           |             | 576.36           |             |
| Latin America & Caribbean  | 2,082.50         |             | 1,278.87         |             | 775.63           |             |
| Middle East & North Africa   | 1,227.06         |             | 1,020.48         |             | 600.23           |             |
| South Asia   | 1,946.30         |             | 726.00           |             | 867.32           |             |
| ESMAP Global Programs  | 6,551.23         |             | 5,396.28         |             | 4,614.61         |             |
| Program Management & Administration  | 2,036.90         | 10%         | 2,040.18         | 11%         | 2,129.08         | 13%         |
| Program Management   | 1,041.73         | 51%         | 988.44           | 48%         | 1,080.64         | 51%         |
| Governance (CG, TAG)   | 134.99           | 7%          | 69.76            | 3%          | 91.57            | 4%          |
| Resource Management/<br>Trust Fund Administration                                    | 294.96           | 14%         | 253.91           | 12%         | 215.14           | 10%         |
| Portfolio Management<br>(Monitoring and Evaluation)                                  | 121.53           | 6%          | 253.66           | 12%         | 245.89           | 12%         |
| Knowledge Forums   | 14.61            | 1%          | 48.43            | 2%          | 28.78            | 1%          |
| Communication and<br>Outreach (publications,<br>website, and other<br>dissemination) | 429.09           | 21%         | 425.98           | 21%         | 467.06           | 22%         |
| <b>Total</b>   | <b>20,606.16</b> | <b>100%</b> | <b>18,252.08</b> | <b>100%</b> | <b>16,996.89</b> | <b>100%</b> |
| Of which:  |                  |             |                  |             |                  |             |
| Funded by Donors   | 19,629.16        |             | 17,388.56        |             | 16,006.34        |             |
| Funded from World Bank<br>Budget   | 437.00           |             | 272.72           |             | 640.23           |             |
| Funded from Fee Income   | 540.00           |             | 590.80           |             | 350.32           |             |

## Notes:

- ESMAP global programs cover global analytical and advisory activities and include activities managed by the ESMAP core team, as well as activities managed by the Sustainable Energy Department, the Environment Department, and other units of the World Bank's Sustainable Development Network.
- Disbursements to the World Bank's regional units in FY2010-12 include ABGs through the ESMAP MDTF and disbursements from the CEIF MDTF, which includes the AFREA program as well as grants for low carbon development and climate change adaptation activities.
- Actual disbursements in FY2012 take into account disbursements made under the ESMAP Multi-Donor Trust Fund for the CEIF, including the AFREA program (which includes World Bank-executed as well as recipient-executed activities), as well as disbursements made under the SIDS DOCK program.
- The total administration cost for Program Management and Administration in FY2012 includes the cost of SIDS DOCK program management.

## DISBURSEMENTS BY PROGRAM AREA

Table 6.3 shows total ESMAP spending for FY2012 by program area:

- Energy Assessments and Strategies Program (EASP)
- Energy Access
- Clean Energy
- Energy Efficient Cities Initiative (EECI)

TABLE 6.3

| ESMAP Disbursements by Program Area, FY2012 (US\$ Thousands) |                 |                 |               |               |               |               |                 |                       |                 |
|--|-----------------|-----------------|---------------|---------------|---------------|---------------|-----------------|-----------------------|-----------------|
|  | AFR             |                 | EAP           | ECA           | LAC           | MNA           | SAR             | ESMAP Global Programs | TOTAL           |
|  | ABG             | AFREA           | ABG           | ABG           | ABG           | ABG           | ABG             |                       |                 |
| <b>EASP</b>  | 169.90          |                 | 37.92         | 296.49        | 287.39        | 148.78        | 594.39          | 994.78                | <b>2,529.66</b> |
| <b>Energy Access</b>   | 725.58          | 5,985.27        | 25.63         | —             | 300.92        | —             | —               | 1,069.16              | <b>8,106.55</b> |
| <b>Clean Energy</b>  | 35.00           |                 | 338.42        | 165.79        | 21.23         | 384.64        | 272.93          | 1,655.09              | <b>2,873.09</b> |
| <b>EECI</b>  | —               |                 | 115.95        | 114.08        | 166.09        | 66.81         | —               | 895.58                | <b>1,358.51</b> |
|  | <b>930.49</b>   | <b>5,985.27</b> |               |               |               |               |                 |                       |                 |
|  | <b>6,915.75</b> | <b>517.91</b>   | <b>576.36</b> | <b>775.63</b> | <b>600.23</b> | <b>867.32</b> | <b>4,614.61</b> | <b>14,867.81</b>      |                 |

World Bank Regions | AFR—Africa | EAP—East Asia and Pacific | ECA—Europe and Central Asia | MNA—Middle East and North Africa | LCR—Latin American and the Caribbean | SAR—South Asia

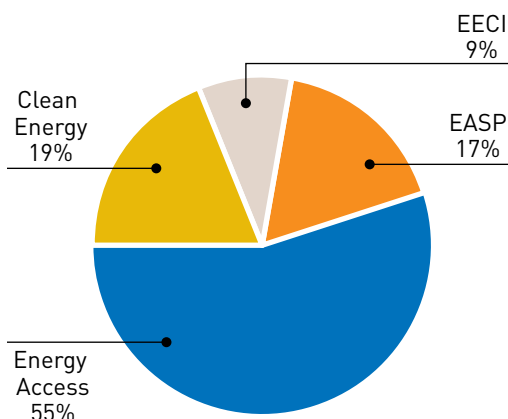
Notes:

- The EASP category includes renewable energy, energy efficiency, and low carbon development activities as part of energy sector assessments and strategy work.
- Of the funding for the World Bank's regional units in FY2012:
  - 42% was through the ABG process under the ESMAP MDTF
  - 58% was as funding for the AFREA program under the CEIF MDTF
- ESMAP global programs cover global analytical and advisory activities and include activities managed by the ESMAP core team, as well as activities managed by the Sustainable Energy Department, the Environment Department, and other units of the World Bank's Sustainable Development Network.

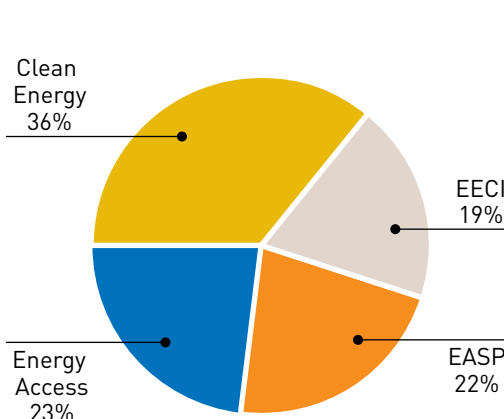


Figures 6.1 and 6.2 illustrate the division of ESMAP spending by program area in FY2012, for the entire program and for ESMAP own-managed activities.

**FIGURE 6.1**  
**ESMAP Spending by Program Area, FY2012**  
*(Entire Program)*



**FIGURE 6.2**  
**ESMAP Spending by Program Area, FY2012**  
*(ESMAP Own-Managed Activities Only)*



**Notes:**

- The EASP category also includes renewable energy, energy efficiency, and low carbon development activities as part of energy sector assessments and strategy work.
- The Energy Access category includes monies spent under the AFREA program.



ANNEX I

# PROCEEDINGS OF CG MEETING, 2012

## CONSULTATIVE GROUP MEETING FOR ENERGY TRUST FUNDED PROGRAMS | ESMAP AND AFREA

10–11 May 2012, Washington DC

The Consultative Group (CG) meeting for the World Bank-managed Energy Trust Funded Programs was held in Washington, DC on May 10–11, 2012. The meeting was chaired by Mr. Vijay Iyer, Director, Sustainable Energy Department, in the World Bank's Sustainable Development Network.

Below are the highlights and follow-up actions out of various discussions, particularly related to ESMAP (including AFREA). For more details regarding each session, please refer to the CG workspace for all relevant reports and briefing materials ([www.esmap.org/cg](http://www.esmap.org/cg)).

### Session 1 | Technical Advisory Group (TAG) Report to the CG

- i. *South-South Knowledge Sharing.* Given the importance of, and opportunities for, learning among developing countries, CG members stressed the need for ESMAP to facilitate South-South Knowledge Sharing.
  - ESMAP has developed a communications strategy for implementation in FY2013, which emphasizes cross-regional learning and stronger external outreach.
  - ESMAP will also assess feasibility of and demand for a series of “mini” regional knowledge events to further promote ESMAP's knowledge exchange and dissemination efforts.

- ii. *Partnership.* CG members stressed how important partnerships are for ESMAP's role in operational leverage, as well as a knowledge clearinghouse and think tank, and appreciated ESMAP's efforts to strengthen this aspect of its work.
  - ESMAP will continue to work with CG members to strengthen communications with their bilateral development agencies and banks, and to identify areas for cooperation.
- iii. *Gender.* CG members noted that gender is currently a key component of AFREA and the Energy Access Program, but that there is still room for improvement to more explicitly and systematically build gender aspects across the ESMAP programs.
- iv. *Communication between the TAG and CG members.* CG members observed that the TAG presentation on recent developments in the energy sector was not conclusive enough. It was also noted that the TAG's communication with the CG has not sufficiently materialized over the past year.
  - ESMAP will introduce a system to better track whether and how activities incorporate gender dimensions and develop gender-related outcome indicators for its M&E system.
  - ESMAP and TAG will develop a work plan for the TAG, including how, when, and where to liaise with CG members during the coming year.

### Session 2 | Africa Renewable Energy Access Program (AFREA)

CG members reiterated their support for the proposed AFREA II as part of the ESMAP

Multi-Donor Trust Fund (MDTF). The budget target is US\$ 11 million annually.

CG Members stated that the work of AFREA II should be more focused and limited, should aim at a more strategic, coherent approach towards transformative change in the energy sector. The added value of AFREA—with substantial funds—should become clear, particularly as quite a few donors are working in the energy sector, mainly on energy access at household level. AFREA II should also take into account other existing organizational structures and should support those in order to avoid competition/duplication.

- The Concept Note for AFREA II would consist of the following proposed types of activities: (i) support to Governments to innovate, (ii) development of market transformation activities, and (iii) filling the knowledge gaps and building capacities. Efforts will be made to build stronger synergies across individual activities and to cooperate with other bilateral and multilateral programs to bring transformative impact. Although some of the programs will focus on selected countries with high transformation potential, efforts will be made to integrate also countries with lower implementation capacity (e.g., post conflict).
- ESMAP will circulate a proposal to amend the ESMAP MDTF Administration Agreement in order to allow for recipient-executed activities under AFREA II.

### Session 3 | ESMAP Portfolio Review

- i. *Focus on Outcomes.* CG members appreciated the effort of ESMAP to report on the

portfolio's results. It was emphasized that the report should be oriented towards measuring the number of outcomes against the performance indicators, and less on counting the number of activities achieving outcomes.

- The Portfolio Review has been revised to present the outcomes achieved against the performance indicators. It also now contains an overview section, summarizing key results.
  - ESMAP will assess the approach used by the Public-Private Infrastructure Advisory Facility (PPIAF) to track long-term change over time of a certain number of activities.
- ii. *Indirect Impacts.* Some CG members proposed that indirect impact be tracked as part of the M&E system. ESMAP noted that it has been cautious about attribution in undertaking the portfolio review. The Chair also cautioned that the M&E system needs to be realistic.
    - The new Business Plan will propose an M&E framework (logframe) that will include global-level goals to which ESMAP's contributions will be measured.
  - iii. *Reporting Format.* CG members suggested that the portfolio review report be more strategic to include the trends and lessons learned from the ESMAP activities.
    - Going forward, the report will be structured to be more strategic, including an analysis that captures lessons from successes and non-performance. The TAG will review the report and identify important strategic and quality implications for the CG's consideration.

ESMAP also confirmed to the CG that members would have read-only access to the new ESMAP M&E web-based portal that is being developed.

#### **Session 4 | External Evaluation of ESMAP**

In five areas assessed through the evaluation—relevance, effectiveness, efficiency, institutional arrangements and management, and sustainability—ESMAP was assessed overall as satisfactory. The CG discussion focused on several of the report's recommendations, as follows:

- i. Mainstream gender and social aspects into ESMAP-supported activities.
  - ESMAP will prepare an Action Plan on the external evaluation, which will be circulated to the CG for comments by end-July, 2012.
- ii. Develop a comprehensive communication strategy to reach out to a wider audience. This could include greater involvement of external partners in reviewing ESMAP products.
- iii. Promote knowledge sharing across countries/regions and with donors. In particular, informing other development partners should be an explicit part of ESMAP's business plan.
- iv. Expand CG membership to developing countries to integrate their perspectives into ESMAP's programs.
  - The CG members suggested that ESMAP use other channels (e.g., knowledge exchange forums at regional levels) to seek client views as an input towards ESMAP's strategy development and work programming.

#### **Other Action Items:**

- CG members will send in any additional comments to ESMAP by May 25, 2012.
- By June 15, 2012, the evaluation team will revise its report based on any additional comments from CG members, as well as the clarifications provided earlier by ESMAP.
- The TAG will observe if ESMAP's renewable work is improving/on track, in response to the report's findings that REMTI did not achieve intended results during the evaluation period.

#### **Session 5 | ESMAP Work Program and Budget for FY13**

- i. ESMAP's work program will continue to have a balance between global knowledge products and country-level assistance. US\$ 7 million of *Annual Block Grants (ABGs)* will be allocated to the Bank's regional operations units for analytical and advisory activities. The following were also highlighted, by thematic program.
  - ii. *Energy Access Program*. The Energy Access Program proposes three new initiatives: *AFREA II* to support sustainable energy solutions for improved access to modern energy services in Sub Saharan Africa (including Lighting Africa expansion); *TA Support to Sustainable Energy for All* to assist countries that opt-in to the universal access target of the SEFA initiative; and *Energy Access for the Peri-Urban/Urban Program* in partnership with the Cities Alliance.
  - iii. *Clean Energy Program*. The program's priorities for FY2013 include: enhancing the World Bank's clean energy capacity through staff training and knowledge management;

promoting geothermal power through a scale-up investment plan; and, continuing capacity building for low carbon development planning. Meso-scale renewable energy resource mapping is proposed as a new initiative, while the SIDS DOCK Support Program is continued.

- iv. *Energy Efficient Cities Initiative*. This program will further emphasize expanding outreach to cities for deployment of TRACE in partnership with external organizations and scaling up operational support for municipal water and wastewater, as well as urban transport operations.
- v. *Energy Strategy and Assessment Program*. META, a user-friendly model to comparatively assess electricity generation options, will be deployed.
- vi. *Results-Based Funding*. ESMAP will continue to work closely with internal and external partners, such as the Global Partnership on Output-Based Aid (GPOBA) and Energy+, to provide operational and advisory support in response to demand from client countries and development partners.

CG members noted that the program is increasing its focus on low income countries, particularly

with activities such as AFREA, Sustainable Energy for All TA, and Resource Mapping.

- ESMAP will undertake an assessment of long-range trends affecting future energy sector development, in particular relating to resource scarcity, particularly the energy-food-water nexus. The work will be carried out with other World Bank units (e.g., Agriculture, Water and Research Units). CG members are also invited to suggest agencies that can partner with ESMAP.
- CG observed that ESMAP's Resources Mapping initiative could have strong appeal to donors at the country level, and suggested that ESMAP prepare a brief note on the proposed program as a "marketing" tool for bilateral funding.

### **Session 6 | SIDS DOCK Support Program**

Due to time constraints, there was no discussion.

- The Danish Ministry of Foreign Affairs plans to undertake a review of the SIDS DOCK portfolio in the second half of FY2013.





# ESMAP PROGRAM OUTPUTS, FY2012

The following tables summarize the status of outputs under each of the ESMAP program areas in FY2012, in line with the monitoring and evaluation system introduced in 2010.

## CLEAN ENERGY

| <b>1 Analytical &amp; Advisory Activities</b> | <b>Economic and Sector Work: Sector or Thematic Reports<br/>Technical Assistance: Implementation / Advisory Reports, Event Proceedings Documents</b>  |
|---|---|
| Djibouti                                      | Geothermal Power Generation Program (Financial Analysis)  |
| Global  | Energy Sector Climate Change Vulnerability Rapid Assessments Framework  |
| Global  | Geothermal Handbook   Planning and Financing Power Generation   |
| Indonesia                                     | Renewable Energy for Electrification   PLN Capacity Building in HOMER   |
| LCR   | Central America Programmatic Study V   Promoting Geothermal Energy  |
| MNA   | Regional Concentrated Solar Power (CSP) Scale-up Initiative   Outputs delivered under Phase III <ul style="list-style-type: none"> <li>• Program Economic Assessment</li> <li>• Report on Appropriate Regulatory Framework for CSP Development in MNA Countries (Jordan)</li> <li>• System Planning Model and Report for Better Integration of Renewable Energy into Interconnected Regional Grids</li> <li>• Tools for Assessment of Economic Impacts of CSP Scale-Up (toolkit, workshop, and report)</li> <li>• Water-Energy Nexus-Desalination Study Dissemination</li> <li>• Site Screening / Pre-Feasibility Work (Tunisia)</li> </ul> |
| Philippines                                   | Philippines Reliable and Sustainable Integration of Renewables in the Competitive Electricity Market  |
| <b>2 Knowledge Products</b>                   | <b>Toolkits, Operational Guides, Models, Handbooks, Databases, Internal and External Trainings, Forums, and Workshops</b>   |
| Conference                                    | Financing Challenges in Scaling-up Geothermal Energy (Geothermal Energy Association International Geothermal Energy Showcase 2012, Washington, DC, 23 May 2012)   |
| Conference                                    | Meeting the Dual Goal of Energy Access and Sustainability   CSP Deploying in Developing Countries (World Renewable Energy Forum, 14–17 May 2012)  |
| Conference                                    | The Moroccan Integrated Solar Combined Cycle (ISCC) Plant at Ain Beni Mathar   Lessons Learned from a CSP Project in a New Environment (SOLARPaces 2011 Conference, Granada, Spain, 20–23 Sep 2011)   |

*(continued on next page)*

## CLEAN ENERGY *(continued)*

|                |  |
|----------------|--|
| Consultation   | Solar Tour (CSP) with South African, Moroccan, and Indian representatives (California, Nevada, 18–24 May 2012)   |
| Knowledge Tool | Energy Forecasting Framework and Emissions Consensus Tool (EFFECT)   |
| Knowledge Tool | Marginal Abatement Cost Tool (MACTool)   |
| Training       | <p>EFFECT</p> <ul style="list-style-type: none"> <li>• Low Carbon Development for 101 participants (with World Bank Institute, Washington, DC, 12 Aug–12 Oct 2012)</li> <li>• EFFECT Capacity Building for Low Carbon Development at the Institute of Energy (Hanoi, Vietnam, 19 Jul 2012)</li> <li>• E-learning course taken by 150 participants</li> </ul> |
| Training       | <p>ESMAP's Renewable Energy Training Program</p> <ul style="list-style-type: none"> <li>• Module 1   Wind (World Bank, Washington, DC, Mar 2012)</li> <li>• Module 2   Solar Photovoltaic (World Bank, Washington, DC, Apr 2012)</li> </ul>  |
| Training       | <p>MACTool</p> <ul style="list-style-type: none"> <li>• MACTool Capacity Building for Atkins Consultants (Washington, DC, 20 Aug 2012)</li> <li>• MACTool Capacity Building for the Brazilian Government (Brasilia, Brazil, 15–19 Oct 2012)</li> </ul>   |
| Training       | Smartening the Grid   From Developed to Developing Countries (World Bank Brown Bag Lunch, Washington, DC, 19 Mar 2012)   |
| Workshop       | Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) Workshop on the Economic Community of West African States (ECOWAS) Program for Small-Scale Hydropower (Monrovia, Liberia, 16–20 Apr 2012)  |

## ENERGY ACCESS

| <b>1</b> | <b>Analytical &amp; Advisory Activities</b> | <b>Economic and Sector Work: Sector or Thematic Reports<br/>Technical Assistance: Implementation / Advisory Reports, Event Proceedings Documents</b>  |
|----------|---|---|
|          | Bangladesh                                  | Stove Users Consultations Report  |
|          | Benin                                       | Increased Access to Modern Energy (Restructuring Paper and Technical Discussions)   |
|          | Global                                      | Annual Block Grants Screened for Gender Considerations (May 2012)   |
|          | Global                                      | Contributions to Corporate Reviews and Reports (e.g., SDN Steps to Strides)   |
|          | Global                                      | ESMAP Gender and Energy Action Plan (developed Jun 2012)  |
|          | Global                                      | ESMED Energy Access for Urban Poor <ul style="list-style-type: none"> <li>• Energy Access and Productive Uses for the Urban Poor (Final Report of Ghana Scoping Study)</li> <li>• Improving Energy Access to the Urban Poor in Developing Countries (Case Studies)</li> <li>• Virtual Consultation and Proceedings</li> <li>• Urban Poor Practitioners Workshop (Face-to-Face Consultation)</li> <li>• Action Plan FY2013–15</li> </ul> |
|          | Peru  | Promoting Productive Uses of Electricity in Rural Areas of Peru   Experience and Lessons Learned  |
|          | Proceedings                                 | Road to Durban   Promoting Sustainable Energy Access for Africa: African Energy Ministers Conference Proceedings Report (Johannesburg, South Africa, 15–16 Sep 2011)  |
| <b>2</b> | <b>Knowledge Products</b>                   | <b>Toolkits, Operational Guides, Models, Handbooks, Databases, Internal and External Trainings, Forums and Workshops</b>  |
|          | Conference                                  | ENERGIA Gender and Energy Conference (Amsterdam, Dec 2011)  |
|          | Conference                                  | US Department of State International Visitor Leadership Program Conference   Women's Climate Leaders (Washington DC, Jun 2012)  |
|          | Newsletter                                  | Addressing the Gender Dimension of Energy Projects in Africa (Sep 2011)   |
|          | Newsletter                                  | Integrating Gender into Energy Operations: Approaches from Pilot Countries (Nov 2011)   |
|          | Presentation                                | MENA Energy Staff Meeting   Sharing Experiences of AFREA Gender and Energy Program (World Bank, Washington, DC, May 2012)   |
|          | Presentation                                | Household Energy-for-Cooking / Sustainable Development Network Forum (Washington DC, Mar 2012)  |
|          | Presentations                               | Sustainable Development Network Forum / ESMAP Knowledge Forum (World Bank, Washington DC, Mar 2012)   |
|          | Training                                    | Gender and Energy After Durban, Opportunities and Challenges for Rio+20 (World Bank, Washington, DC, Jan 2012)  |

## ENERGY ACCESS | AFREA

### A. Africa Clean Cooking Energy Solutions (ACCES)

|   |  |
|---|--|
| <b>1 Analytical &amp; Advisory Activities</b> | <b>Economic and Sector Work: Sector or Thematic Reports<br/>Technical Assistance: Implementation / Advisory Reports, Event Proceedings Documents</b> |
| AFR   | Country Engagement   Country Prioritization Assessment in Landscape Report (East Africa Alliance Workshop)   |
| <b>2 Knowledge Products</b>                   | <b>Toolkits, Operational Guides, Models, Handbooks, Databases, Internal and External Trainings, Forums and Workshops</b>                             |
| Consultation                                  | East, West, and Southern Africa consultations: 3 consultation event reports disseminated; Consolidated stakeholder report (Nairobi, Accra, Maputo)   |

### B. Africa Electrification Initiative (AEI)

|   |  |
|---|--|
| <b>1 Analytical &amp; Advisory Activities</b> | <b>Economic and Sector Work: Sector or Thematic Reports<br/>Technical Assistance: Implementation / Advisory Reports, Event Proceedings Documents</b>   |
| AFR   | Discussion papers/write-ups posted since July 2011 via AEI Online Social Collaborative Network: <ul style="list-style-type: none"> <li>• Strategies for Promoting Productive Uses of Electricity</li> <li>• Improving Electricity Access for the Urban Poor in African Cities</li> <li>• Amélioration de l'Accès à l'Électricité pour les Pauvres dans les Zones Urbaines Africaines (French)</li> <li>• Institutional Approaches to Electrification</li> <li>• Approches Institutionnelles de l'Électrification (French)</li> </ul> |
| AFR   | Impact Evaluation of Productive Use   An Implementation Guide for Electrification Projects (led by EUEI)   |
| Senegal                                       | AEI Dakar Workshop Proceedings   |
| Sub-Saharan Africa                            | AEI Call for Papers on Innovative Approaches for Access Scale-Up (10 papers submitted by SSA electrification) <p>Winning papers:</p> <ul style="list-style-type: none"> <li>• Electrification Rurale en Zone Faiblement Monétarisée: Approche Innovante Pour L'électrification du village de Goyala en République de Guinée</li> <li>• Namibian Policy Perspectives on Solar Energy</li> </ul>   |

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## ENERGY ACCESS | AFREA *(continued)*

|          |   |  |
|----------|---|--|
| <b>2</b> | <b>Knowledge Products</b>                   | <b>Toolkits, Operational Guides, Models, Handbooks, Databases, Internal and External Trainings, Forums and Workshops</b>   |
|          | Training                                    | Private Sector Enabling Acceleration to Universal Access Panel and Paying for Results in the Energy Sector Workshop (World Bank Energy Days 2012, Washington, DC, 23 Feb–1 Mar 2012) |
|          | Training                                    | Regulatory Review of the Power Purchase Agreements in Tanzania (Washington, DC, 11 Jul 2012)   |
|          | Training                                    | Urban and Peri-Urban Energy Access Practitioners' Forum (ESMAP Knowledge Exchange Forum 2012, Washington, DC, 7–8 May 2012)  |
|          | Workshop                                    | Institutional Approaches to Electrification Practitioners' Workshop (Dakar, Senegal, 14–16 Nov 2011)   |
|          | Workshop                                    | Productive Use of Energy Practitioners' Workshop (led by EUEI-PDF; Nairobi, Kenya, 20–22 Sep 2011)   |
|          | Workshop                                    | Promoting Low Carbon Energy in Africa through Carbon Finance Workshop (Africa Carbon Forum 2012, Addis Ababa, Ethiopia, 17–20 Apr 2012)  |
| <b>3</b> | <b>Africa Gender and Energy Program</b>     |  |
| <b>1</b> | <b>Analytical &amp; Advisory Activities</b> | <b>Economic and Sector Work: Sector or Thematic Reports<br/>Technical Assistance: Implementation / Advisory Reports, Event Proceedings Documents</b>                                 |
|          | AFR   | Gender support and contribution to the Africa Clean Cookstoves Energy Solutions Program (ACCES)  |
|          | AFR   | Network of gender and energy experts in the Africa region established and expanding  |
|          | Mali  | Gender Assessments   Mali (Jul 2011)   |
|          | Mali  | Gender Focal Point Terms of Reference and Position developed in Mali/AMADER (Aug 2011)   |
|          | Mali, Tanzania, Senegal, Kenya, Benin       | Africa Gender & Energy Program activities initiated and implemented in Mali, Tanzania, Senegal, Kenya, and Benin   |
|          | Tanzania                                    | Gender Assessments   Tanzania (May 2011)   |
| <b>2</b> | <b>Knowledge Products</b>                   | <b>Toolkits, Operational Guides, Models, Handbooks, Databases, Internal and External Trainings, Forums and Workshops</b>   |
|          | Newsletter                                  | Tanzania   Championing Energy Solutions for Women (May 2012)   |
|          | Report                                      | Expanding Women's Role in Africa's Modern Off-Grid Lighting Market (French, Oct 2011)  |

*(continued on next page)*

## ENERGY ACCESS | AFREA *(continued)*

|          |  |
|----------|--|
| Video    | ThinkEqual 2012 Campaign   Mali Gender and Energy Documented   |
| Workshop | Gender and Energy session and knowledge exchange (AEI Workshop, Senegal, Nov 2011)   |
| Workshop | AMADER Gender and Energy Workshop (Mali, Nov 2011)   |
| Workshop | Rural Energy Agency Workshop (Tanzania, Jun 2012)  |
| <b>4</b> | <b>Biomass Energy Initiative for Africa (BEIA; Bank Executed)</b>  |
| <b>1</b> | <b>Analytical &amp; Advisory Activities</b>  |
|          | <b>Economic and Sector Work: Sector or Thematic Reports<br/>Technical Assistance: Implementation / Advisory Reports, Event Proceedings Documents</b> |
| AFR      | Wood-Based Biomass Energy Development for Sub-Saharan Africa   Issues and Approaches   |
| <b>5</b> | <b>Capacity Upgrading for West African Partners in Renewable Energy Education Project (REEP)</b>   |
| <b>1</b> | <b>Analytical &amp; Advisory Activities</b>  |
|          | <b>Economic and Sector Work: Sector or Thematic Reports<br/>Technical Assistance: Implementation / Advisory Reports, Event Proceedings Documents</b> |
| Ghana    | Integration of Photovoltaic Output into Electricity Distribution Grids   Studies on a 4 kWp System in Ghana (Sep 2011)                               |
| <b>2</b> | <b>Knowledge Products</b>  |
|          | <b>Toolkits, Operational Guides, Models, Handbooks, Databases, Internal and External Trainings, Forums and Workshops</b>                             |
| Training | GIS Energy Planning and RETScreen training at KNUST (Ghana, Aug 2011)  |
| Training | Renewable Energy Technologies and Energy Policy Training Program (7 sessions at KNUST/2IE, Ghana, Jan–May 2012)                                      |
| Webinar  | CSP Technologies for Harnessing Solar Energy in Africa—Schott Solar (Aug 2011)   |
| Webinar  | Resource Assessment for CSP Feasibility, a ECREEE—CENER project (May 2012)   |
| Workshop | International Solar Energy Experts workshop (I-SEE 2012)—College of Engineering, KNUST (Ghana, May 2012)   |

## ENERGY EFFICIENT CITIES INITIATIVE (EECI)

|          |   |  |
|----------|---|--|
| <b>1</b> | <b>Analytical &amp; Advisory Activities</b> | <b>Economic and Sector Work: Sector or Thematic Reports<br/>Technical Assistance: Implementation / Advisory Reports, Event Proceedings Documents</b>   |
|          | China                                       | Beijing Rooftop Solar Photovoltaic Scale-up Project  |
|          | China                                       | Green Energy for Low Carbon City in Shanghai Project   |
|          | China                                       | Improving Energy Efficiency in Public Institutions   |
|          | Global                                      | Energy Efficiency Programs and Barrier Removal Costs   |
|          | Global                                      | Primer on Energy Efficiency for Municipal Water and Wastewater Utilities   |
|          | Global                                      | Public Procurement of Energy Efficient Products  |
|          | Uruguay                                     | Operational Support   Uruguay Obras Sanitarias del Estado Sustainable and Efficient Project  |
| <b>2</b> | <b>Knowledge Products</b>                   | <b>Toolkits, Operational Guides, Models, Handbooks, Databases, Internal and External Trainings, Forums, and Workshops</b>  |
|          | Case Study                                  | Light Emitting Diode Street Lighting Retrofit (Los Angeles, California)  |
|          | Case Study                                  | Low-Income Housing Energy Efficiency Project (Cape Town, South Africa)   |
|          | Case Study                                  | Municipal Eco Purchasing (Vienna, Austria)   |
|          | Case Study                                  | Municipal Energy Efficiency Fund (Ann Arbor, Michigan)   |
|          | Conference                                  | Energy Efficiency and ICLEI Conference (Belo Horizonte, Brazil, 12–19 Jun 2012)  |
|          | Conference                                  | Energy Efficiency Global 2012 (Orlando, Florida, 27–29 Mar 2012)   |
|          | Conference                                  | Sustainable Development Network Forum 2012 (World Bank, Washington, DC, Feb 2012)  |
|          | Knowledge Tool Deployment                   | TRACE assessments conducted for evaluating energy efficiency opportunities across all sectors in 7 cities: <ul style="list-style-type: none"> <li>• Banja Luka (Bosnia Herzegovina)</li> <li>• Belgrade (Serbia)</li> <li>• Belo Horizonte (Brazil)</li> <li>• Pristina (Kosovo)</li> <li>• Quezon City (Philippines)</li> <li>• Sarajevo (Bosnia Herzegovina)</li> <li>• Tbilisi (Georgia)</li> </ul> |
|          | Training                                    | Energy Efficiency for Water and Sanitation ( World Bank, Washington DC, Mar 2012)  |
|          | Training                                    | Public Procurement of Energy Efficient Products Practitioners' Workshop (World Bank, Washington DC, 7–8 Jun 2012)  |
|          | Workshop                                    | Presentation at LCS-Rnet Conference (Paris, 13–14 Oct 2011)  |
|          | Workshops                                   | Leaders in Urban Transport Planning Workshops (Singapore, Jan 2012; Marseille, Jun 2012; and Fuzhou, Jun 2012)   |

## ENERGY ASSESSMENTS AND STRATEGIES PROGRAM

| <b>1 Analytical &amp; Advisory Activities</b> | <b>Economic and Sector Work: Sector or Thematic Reports<br/>Technical Assistance: Implementation / Advisory Reports, Event Proceedings Documents</b>   |
|---|--|
| Armenia                                       | Study of Demand-Side Management Tools  |
| China   | Urban Transport Climate Change Strategy  |
| Caucasus                                      | Stock Taking   Regional Power Trade in the Southern Caucasus (Phase I Consolidated Report)   |
| Global  | Revisiting Policy Options on the Market  |
| Global  | Key Drivers of Public-Private Partnerships (PPPs) in Electricity Generation in Developing Countries   Cross-Country Evidence of Switching between PPP Investment in Fossil Fuel and Renewable-Based Generation |
| Vietnam                                       | Vietnam Power Sector   Overview and Prospects  |
| Lebanon                                       | Thermal Standards for Buildings   Review and Implementation Plan   |
| Maldives                                      | Developing a Regulatory Framework for the Maldives Energy Sector   |
| Egypt   | Institutional Framework for Implementation of Energy Efficiency in Egypt   |
| Moldova                                       | Chişinău Heat and Electricity Supply Institutional and Financial Restructuring Study (Phase 2 Final Report)  |
| Nepal   | Workshop on Cumulative Impact Assessment of Hydropower Development in Nepal  |
| India   | Lighting Rural India Experience of Rural Load Segregation Schemes in States  |
| India   | Review of Financial Restructuring Plan of Nepal Electricity Authority  |
| Ukraine                                       | Modernization of the District Heating Systems in Ukraine   Heat Metering and Consumption-Based Billing   |
| Uzbekistan / Afghanistan / Pakistan           | Regional Electricity Supply and Trade  |
| Jordan  | Assessment of Smart Grid Application to Jordan Transmission System   |
| <b>2 Knowledge Products</b>                   | <b>Toolkits, Operational Guides, Models, Handbooks, Databases, Internal and External Trainings, Forums, and Workshops</b>  |
| Knowledge Tool                                | Model for Electricity Technology Assessment (META)   |

World Bank Regions | AFR—Africa | EAP—East Asia and Pacific | ECA—Europe and Central Asia | MNA—Middle East and North Africa | LCR—Latin American and the Caribbean | SAR—South Asia

ANNEX III

WORLD BANK  
GROUP LENDING  
OPERATIONS  
INFLUENCED  
BY ESMAP  
ACTIVITIES  
FY2009–12



Over the past four fiscal years (FY2009 through FY2012), ESMAP activities have contributed to the identification and design of approved World

Bank Group lending of US\$ 13.99 billion. The following is a list of lending operations influenced by ESMAP activities during this period.

## WORLD BANK GROUP LENDING OPERATIONS INFLUENCED BY ESMAP ACTIVITIES, FY2009–12

| WBG Lending Operation   | Region | Country                                      |
|---|--------|--|
| Regional and Domestic Power Market Development Project                                  | AFR    | Africa                                       |
| Southern African Power Market Project (Adaptable Program Loan 1)                        | AFR    | Africa                                       |
| Energy Access Project   | AFR    | Burkina Faso                                 |
| Energy Sector Development Project   | AFR    | Cameroon                                     |
| Forest Investment Program   | AFR    | Congo, Democratic Republic of                |
| Growth with Governance in the Mineral Sector  | AFR    | Congo, Democratic Republic of                |
| West Africa Power Pool Adaptable Program Loan 4 (Phase 1)                               | AFR    | Côte d'Ivoire, Sierra Leone, Liberia, Guinea |
| Ghana Energy Development and Access Project (GEDAP)                                     | AFR    | Ghana  |
| Electricity Expansion Project   | AFR    | Kenya  |
| Liberia Electricity System Enhancement Project (Additional Financing)                   | AFR    | Liberia                                      |
| Lighting Lives in Liberia   | AFR    | Liberia                                      |
| Energy Sector Project   | AFR    | Malawi                                       |
| Household Energy and Universal Access Project (Additional Financing)                    | AFR    | Mali   |
| Scaling Up Renewable Energy Program   | AFR    | Mali   |
| Energy Development and Access Project   | AFR    | Mozambique                                   |
| Energy Development and Access Project (EDAP)  | AFR    | Mozambique                                   |
| Mozambique-Malawi Transmission Interconnection Project (Adjustable Programmatic Loan 2) | AFR    | Mozambique-Malawi                            |
| Electricity Access Scale-up and Sector Wide Approach Development Project                | AFR    | Rwanda                                       |

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## WORLD BANK GROUP LENDING OPERATIONS INFLUENCED BY ESMAP ACTIVITIES, FY2009–12 *(continued)*

| WBG Lending Operation   | Region | Country                          |
|---|--------|----------------------------------|
| Second Sustainable and Participatory Energy Management Project (PROGEDE II) | AFR    | Senegal                          |
| Eskom Renewables Support Project  | AFR    | South Africa                     |
| Energy Development and Access Project                                       | AFR    | Tanzania                         |
| Sustainable Management of Mineral Resources                                 | AFR    | Tanzania                         |
| Rural Electrification and Transmission Project                              | EAP    | Cambodia                         |
| Global Environment Facility Provincial Energy Efficiency Scale-up Program   | EAP    | China                            |
| Global Environment Facility Tianjin Eco-city Project                        | EAP    | China                            |
| Guangdong Green Freight Demonstration Project                               | EAP    | China                            |
| Ningbo New Countryside Development Project                                  | EAP    | China                            |
| Shangdong Province Energy Efficiency  | EAP    | China                            |
| Climate Change Development Policy Loan I                                    | EAP    | Indonesia                        |
| Climate Change Development Policy Loan II                                   | EAP    | Indonesia                        |
| Geothermal Clean Energy Investment Project                                  | EAP    | Indonesia                        |
| Rural Electrification Project—Phase I (Adaptable Program Loan)              | EAP    | Lao People's Democratic Republic |
| Rural Electrification Project—Phase II                                      | EAP    | Lao People's Democratic Republic |
| Mining Sector Technical Assistance Project                                  | EAP    | Mongolia                         |
| Second Mining Sector Institutional Strengthening Technical Assistance       | EAP    | Papua New Guinea                 |
| Clean Technology Fund (IFC)   | EAP    | Philippines                      |
| Kunming Urban Rail Project  | EAP    | Regional                         |
| Climate Change Development Policy Loan                                      | EAP    | Vietnam                          |
| Ho Chi Minh City Green Transport  | EAP    | Vietnam                          |
| Poverty Reduction Strategy Credit 10  | EAP    | Vietnam                          |
| Power Sector Reform (Development Policy Operation 2)                        | EAP    | Vietnam                          |
| Vietnam Poverty Reduction Strategy Credit 9                                 | EAP    | Vietnam                          |

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## WORLD BANK GROUP LENDING OPERATIONS INFLUENCED BY ESMAP ACTIVITIES, FY2009–12 *(continued)*

| WBG Lending Operation  | Region | Country                                |
|--|--------|--|
| Vietnam Transmission and Distribution (Additional Financing 2)                       | EAP    | Vietnam                                |
| Electricity Supply Reliability Project   | ECA    | Armenia                                |
| Energy Efficiency Project  | ECA    | Armenia                                |
| Global Environment Facility Sustainable Energy Project                               | ECA    | Macedonia, former Yugoslav Republic of |
| Energy Project II (Additional Financing)   | ECA    | Moldova                                |
| Energy Efficiency Development Policy Loan  | ECA    | Poland                                 |
| Energy Community of South East Europe Adaptable Program Loan                         | ECA    | South Eastern Europe                   |
| Energy Community of South East Europe (ECSEE) Adaptable Program Loan #6              | ECA    | Turkey                                 |
| Environmental Sustainability and Energy Sector (Development Policy Loan 2)           | ECA    | Turkey                                 |
| Private Sector Renewable Energy and Energy Efficiency Project                        | ECA    | Turkey                                 |
| Private Sector Renewable Energy and Energy Efficiency Project (Additional Financing) | ECA    | Turkey                                 |
| Programmatic Electricity Sector Development Policy Loan                              | ECA    | Turkey                                 |
| Small- and Medium-Enterprises Energy Efficiency Project                              | ECA    | Turkey                                 |
| Energy Efficiency Project  | ECA    | Ukraine                                |
| Ukraine Energy Efficiency Project  | ECA    | Ukraine                                |
| Energy Efficient Industrial Enterprises  | ECA    | Uzbekistan                             |
| Decentralized Infrastructure for Rural Transformation Project (IDTR)                 | LCR    | Bolivia                                |
| Electrobras Distribution Rehabilitation Project                                      | LCR    | Brazil                                 |
| Rebuilding Energy Infrastructure and Access Project                                  | LCR    | Haiti                                  |
| Power Sector Efficiency Enhancement Project (PROMEf)                                 | LCR    | Honduras                               |
| Scaling Up Renewable Energy Program - Honduras Investment Plan                       | LCR    | Honduras                               |
| Energy Investments and Technical Assistance  | LCR    | Jamaica                                |
| Efficient Lighting and Appliances  | LCR    | Mexico                                 |
| Framework for Green Growth Development Policy Loan                                   | LCR    | Mexico                                 |

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## WORLD BANK GROUP LENDING OPERATIONS INFLUENCED BY ESMAP ACTIVITIES, FY2009–12 *(continued)*

| WBG Lending Operation  | Region | Country                 |
|--|--------|-------------------------|
| Global Environment Facility Energy Efficient Lighting and Appliances Project       | LCR    | Mexico                  |
| Global Environment Facility Wind Umbrella Project III                              | LCR    | Mexico                  |
| Low Carbon Development Policy Loan   | LCR    | Mexico                  |
| First Rural Electrification Project  | LCR    | Peru                    |
| Rural Electrification Project  | LCR    | Peru                    |
| Second Rural Electrification Project   | LCR    | Peru                    |
| Ain Sokhna Power   | MNA    | Egypt, Arab Republic of |
| Giza North Power Project   | MNA    | Egypt, Arab Republic of |
| Helwan South Power Project   | MNA    | Egypt, Arab Republic of |
| Kom Ombo Solar Power   | MNA    | Egypt, Arab Republic of |
| Wind Power Development Project   | MNA    | Egypt, Arab Republic of |
| Energy Sector Development Policy Loan  | MNA    | Morocco                 |
| Ouarzazate Concentrated Solar Power  | MNA    | Morocco                 |
| Urban Transport Development Policy Loan  | MNA    | Morocco                 |
| Concentrated Solar Power   | MNA    | Tunisia                 |
| Energy Efficiency and Renewable Energy Investment Project                          | MNA    | Tunisia                 |
| Tunisian Electricity and Gas Company (STEG) Concentrated Solar Power               | MNA    | Tunisia                 |
| Municipal Development Program Phase I  | MNA    | West Bank and Gaza      |
| Power System Development Project   | SAR    | Afghanistan             |
| Clean Air Sustainable Environment (CASE) Project                                   | SAR    | Bangladesh              |
| Rural Electrification and Renewable Energy Development (RERED; Additional Funding) | SAR    | Bangladesh              |
| Coal-Fired Generation Rehabilitation   | SAR    | India                   |
| Coal-Fired Generation Rehabilitation   | SAR    | India                   |

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## WORLD BANK GROUP LENDING OPERATIONS INFLUENCED BY ESMAP ACTIVITIES, FY2009–12 *(continued)*

| WBG Lending Operation  | Region | Country  |
|--|--------|----------|
| Haryana Power System Improvement Project   | SAR    | India    |
| IFC Loan for Maharashtra State Electricity Transmission Corporation Limited (MSETCL) | SAR    | India    |
| Kabeli Transmission Project  | SAR    | Nepal    |
| Electricity Distribution and Transmission Improvement Program Project                | SAR    | Pakistan |

**World Bank Regions** | **AFR**—Africa | **EAP**—East Asia and Pacific | **ECA**—Europe and Central Asia | **MNA**—Middle East and North Africa | **LCR**—Latin American and the Caribbean | **SAR**—South Asia



NEW,  
ONGOING AND  
COMPLETED  
ACTIVITIES,  
FISCAL YEAR  
2012

## NEW ACTIVITIES

| Country/Region      | Activity  | Task Manager                     |
|---------------------|---|----------------------------------|
| <b>CLEAN ENERGY</b> |   |                                  |
| Belarus             | Biomass-Based District Heating  | Pekka Kalevi Salminen            |
| China               | Capacity Building for Smart Grid Development in China   | Ximing Peng                      |
| China               | Defining and Measuring Low Carbon Cities in China   | Xiaodong Wang                    |
| China               | Low Carbon Cities Platform  | Axel E. N. Baeumler              |
| Global              | Clean Energy Guidebooks and Briefs  | Silvia Martinez Romero           |
| Global              | Clean Energy Staff Training & Knowledge Platform  | Silvia Martinez Romero           |
| Global              | Climate Vulnerability in the Energy Sector  | Pierre Audinet                   |
| Global              | Energy Sector Low Carbon Development Operational Support  | Pierre Audinet                   |
| Global              | Geothermal Scale-Up Investment Plan   | Pierre Audinet                   |
| Global              | Integration of Renewable Energy into Low Carbon Infrastructure  | Silvia Martinez Romero           |
| Global              | SIDS DOCK   Energy Innovation Fund  | Habiba Gitay                     |
| Global              | SIDS DOCK   Revolving Fund Options Paper  | Jarl Krausing                    |
| Global              | SIDS DOCK   Virtual Network to Support SIDS DOCK Platform   | Ethelstan Angus Friday           |
| Global              | Smart Grids Guidebooks  | Marcelino Madrigal               |
| LCR                 | Climate Market Auction   Best Practices   | Chandra Shekhar Sinha            |
| Lebanon             | Wind Power Development Study  | Simon J. Stolp                   |
| MNA                 | Technical Assistance to Develop Tools for Electricity Assessment of Mediterranean Renewable Energy Projects | Silvia Pariente-David            |
| Tunisia             | Greenhouse Gas Mitigation Action Plan in Transport Sector   | Olivier P. Le Ber                |
| Tunisia             | Low Carbon Power Sector Strategy  | Fanny Kathinka Missfeldt-Ringius |
| Turkey              | National Watershed Management   | Aziz Bouzاهر                     |

*(continued on next page)*

## NEW ACTIVITIES *(continued)*

| Country/Region   | Activity  | Task Manager           |
|--|---|------------------------|
| <b>ENERGY ACCESS</b>                                     |   |                        |
| AFR  | Clean Cooking Initiative for Africa   | Dana Rysankova         |
| AFR  | Lighting Africa Program Expansion   | Daniel J. Murphy       |
| Global   | Clean Cookstoves Mapping  | Venkata Ramana Putti   |
| Global   | Defining and Measuring Access to Energy   | Mikul Bhatia           |
| Global   | Economics of Household Energy   | Venkata Ramana Putti   |
| Global   | Household Energy Guidance Note  | Koffi Ekouevi          |
| Niger  | Energy Sector Assessment  | Issa Diaw              |
| Philippines  | Rural Electricity Cooperatives   Reform and Restructuring   | Alan F. Townsend       |
| <b>ENERGY EFFICIENCY</b>                                 |   |                        |
| AFR  | Energy Efficiency in African Cities   | Karan Kapoor           |
| Brazil   | Green Freight Transport   | Georges Bianco Darido  |
| China  | Provincial Energy Efficiency Practitioners Forum  | Gailius J. Draugelis   |
| Global   | Making Cities More Energy Efficient   | Feng Liu               |
| Global   | Public Procurement of Energy Efficient Products   | Jasneet Singh          |
| Global   | Capacity Building for Energy Efficiency Urban Transport   | Om Prakash Agarwal     |
| Ukraine  | Facilitating Commercial Municipal Energy Efficiency Finance in Ukraine                              | Astrid Manroth         |
| Vietnam  | Improving Energy Efficiency of Bus Services in Ho Chi Minh City                                     | Ke Fang                |
| <b>ENERGY ASSESSMENTS AND STRATEGIES PROGRAMS (EASP)</b> |   |                        |
| Armenia  | Power Sector Tariff Study   | Artur Kochnakyan       |
| Balkans  | Regional Energy Development Strategy Update   | Salvador Rivera        |
| Egypt  | Policy Note on Social Accountability in the Egypt Energy Sector                                     | Vladislav Vucetic      |
| Global   | International Experience with Private Sector Participation and Open Access in Power Grids           | Victor B. Loksha       |
| LCR  | Impacts of High Oil Prices in Latin America and the Caribbean   Short and Medium Run Considerations | Rigoberto Yopez-Garcia |

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## NEW ACTIVITIES *(continued)*

| Country/Region                 | Activity   | Task Manager             |
|--------------------------------|--|--------------------------|
| MENA                           | Synchronization of Mashreq, Turkey, and European Union Electricity Grids | Waleed Saleh I. Alsuraih |
| Peru                           | Technical Assistance for Energy Planning                                 | David Reinstein          |
| Tajikistan                     | Study on Power Supply Options Assessment                                 | Daryl Fields             |
| <b>RESULTS-BASED FINANCING</b> |  |                          |
| Global                         | Results-Based Funding for Energy Sector Development   Knowledge Products | Oliver Knight            |

## ONGOING ACTIVITIES

| Country/Region       | Activity  | TASK MANAGER               |
|----------------------|---|----------------------------|
| <b>CLEAN ENERGY</b>  |   |                            |
| China                | Evaluation of Incentive Mechanisms (Taxation & Pricing) for Wind Power in China                       | Yanqin Song                |
| Global               | Low Carbon Development in Power Sector  | Venkata Ramana Putti       |
| India                | Concentrated Solar Power Initiative   | Ashish Khanna              |
| Indonesia            | Geothermal Risk Mitigation Framework in Indonesia   | Migara Jayawardena         |
| MNA                  | North Africa Regional Concentrated Solar Power Initiative   | Chandrasekar Govindarajalu |
| Nigeria              | Climate Change Implications for Growth in the Non-Oil Sector in Nigeria                               | Raffaello Cervigni         |
| Yemen                | Renewable Energy Framework  | Jianping Zhao              |
| <b>ENERGY ACCESS</b> |   |                            |
| Africa               | 3A-ESMAP Africa Electrification Experience  | Dana Rysankova             |
| Global               | Direct Delivery of Power Subsidy to Rural Areas   | Mohinder Gulati            |
| Global               | Just-in-Time Technical Assistance with Local/ Global Gender & Energy Experts                          | Adriana Eftimie            |
| Haiti                | Strategic Development of Household and Other Energy Sector  | Karen Bazex                |
| LCR                  | Central America Programmatic Study Module #7   Performance of Improved Cook Stoves in Central America |                            |

*(continued on next page)*

## ONGOING ACTIVITIES *(continued)*

| Country/Region   | Activity   | TASK MANAGER          |
|--|--|-----------------------|
| <b>ENERGY EFFICIENCY</b>                                 |  |                       |
| Belarus  | Energy Efficiency  | Pekka Kalevi Salminen |
| ECA  | Climate Friendly Energy Efficient policies across South Eastern Europe                       | Jas Singh             |
| Egypt  | Cairo Congestion Study   | Ziad Salim EL Nakat   |
| Global   | Energy Efficient Cities Initiative Outreach & Dissemination                                  | Feng Liu              |
| Global   | Energy Efficient Cities Project Support Facility   | Feng Liu              |
| <b>ENERGY ASSESSMENTS AND STRATEGIES PROGRAMS (EASP)</b> |  |                       |
| Bulgaria   | Gas Sector Study   | Peter Johansen        |
| China  | Heat Regulation Phase II   | Gailius J. Draugelis  |
| India  | The Indian Power Sector   A Stocktaking and Directions for the Future                        | Sheoli Pargal         |
| India  | Understanding Private Sector Participation in Hydropower Development                         | Kwawu Mensan Gaba     |
|  |  | Xiaoping Wang         |
| MNA  | Assessment of Institutional and Regulatory Framework for Electricity Trade in the Arab World | Husam Mohamed Beides  |
| Uzbekistan   | Energy Efficiency Strategy for Industrial Enterprises in Uzbekistan                          | Franz Gerner          |

## COMPLETED ACTIVITIES

| Country/Region      | Activity  | Task Manager     |
|---------------------|---|------------------|
| <b>CLEAN ENERGY</b> |   |                  |
| Global              | Adaptation Country Briefs                               | Pierre Audinet   |
| Global              | Adaptation Knowledge Dissemination                      | Pierre Audinet   |
| Global              | Energy Efficient Cities Initiative Good Practice Awards | Feng Liu         |
| Global              | Geothermal Handbook                                     | Magnus Gehringer |
| Global              | Low Carbon Country Studies Knowledge Products           | Pierre Audinet   |

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## COMPLETED ACTIVITIES *(continued)*

| Country/Region           | Activity  | Task Manager                    |
|--------------------------|---|---------------------------------|
| Global                   | Scaling Up the Deployment of Grid-Connected Renewable Energy Technologies in Developing Countries | Cindy Suh                       |
| Global                   | Work on Gender and Youth in Extractive Industries   | Adriana Eftimie                 |
| Indonesia                | Renewable Energy for Electrification   PLN Capacity Building in HOMER                             | Dhruva Sahai                    |
| Jordan                   | Assessment of Smart Grid Application to Jordan Transmission System                                | Husam Mohamed Beides            |
| LCR                      | Central America Programmatic Study V   Promoting Geothermal Energy                                | Xiaoping Wang                   |
| Philippines              | Renewable Development & Market Reform   | Beatriz Arizu de Jablonski      |
| Serbia                   | Low Carbon Energy Path  | Salvador Rivera                 |
| <b>ENERGY ACCESS</b>     |   |                                 |
| AFR                      | Road to Durban   Energy Ministers Event   | Karan Capoor                    |
| Global                   | ESMED Energy Access for Urban Poor  | Gabriela Elizondo Azuela        |
| Peru                     | Capacity Building for Productive Use of Energy in Peru  | Susan V. Bogach                 |
| <b>ENERGY EFFICIENCY</b> |   |                                 |
| China                    | Energy Efficiency in Government Facilities in China   | Alberto Ugalde Ang Co           |
| Belarus & Ukraine        | District Heating Analytic & Advisory Activities   | Yadviga Viktorivna Semikolenova |
| China                    | Urban Transport Climate Change Strategy   | Ke Fang                         |
| Egypt                    | Energy Efficiency Strategy  | Jianping Zhao                   |
| Global                   | Energy Efficiency for Water and Sanitation Utilities  | Feng Liu                        |
| Global                   | Analysis of Costs of Delivering Demand Side Energy Efficiency Activities                          | Ashok Sarkar                    |
| Jordan                   | Energy Efficient Cities Initiative Small Grants (Zarqa)   | Feng Liu                        |
| Pakistan                 | Support for the Development of a Large-Scale Energy Efficient Lighting Program                    | Richard Spencer                 |

*(continued on next page)*

## COMPLETED ACTIVITIES *(continued)*

| Country/Region   | Activity  | Task Manager               |
|--|---|----------------------------|
| <b>ENERGY ASSESSMENTS AND STRATEGIES PROGRAMS (EASP)</b> |   |                            |
| Armenia  | Study of Demand-Side Management Tools   | Artur Kochnakyan           |
| Caucasus   | Regional Energy Sector Note   | Salvador Rivera            |
| Global   | Model for Electricity Technology Assessment (META)                                | Sameer Shukla              |
| Global   | Power Sector Market Structure   | Maria Vagliasindi          |
| Global   | Private and Public Sector Roles in the Power Sector   Towards a New Policy Agenda | Maria Vagliasindi          |
| LCR  | Central America Programmatic Study Module #6   Diversification of Energy Matrix   | Xiaoping Wang              |
| LCR  | Managing High & Volatile Oil Prices   | Rigoberto Yopez-Garcia     |
| Lebanon  | Support to Implementation of Electricity Sector                                   | Simon J. Stolp             |
| Maldives   | Developing a Regulatory Framework for Maldives Energy Sector                      | Abdulaziz Faghi            |
| Nepal  | Support to Strategic Energy Sector Development                                    | Michael Haney              |
| SAR  | South Asian Regional Energy Assessment  | Mohua Mukherjee            |
| Uzbekistan, Afghanistan, Pakistan                        | Uzbekistan-Afghanistan-Pakistan Regional Electricity Supply & Trade               | Sunil Kumar Khosla         |
| Vietnam  | Energy Reform Dissemination & Outreach  | Beatriz Arizu de Jablonski |

**World Bank Regions** | **AFR**—Africa | **EAP**—East Asia and Pacific | **ECA**—Europe and Central Asia | **MNA**—Middle East and North Africa | **LCR**—Latin American and the Caribbean | **SAR**—South Asia



ANNEX V

# PUBLICATIONS, FY2012



| ISBN, Pub. No., Or Project ID                                | Country/ Region | Title  | Author/PTL/Program  |
|--|-----------------|--|---|
| AFREA brochure   | AFR             | Africa Renewable Energy Access Program (AFREA)   | Juliet Pumpuni  |
| Lighting Africa publication                                  | AFR             | Expanding Women's Role in Africa's Modern Off-Grid Lighting Market   | Carmen Niethammer, Peter Alston, Brendon Mendonça, Adriana Eftimie                |
| Executive Summary  | AFR             | Household Energy Access for Cooking and Heating   Lessons Learned and the Way Forward  | Koffi Ekouevi, Voravate Tuntivate   |
| AFREA publication  | AFR             | Institutional Approaches to Electrification   The Experience of Rural Energy Agencies / Rural Energy Funds in Sub-Saharan Africa | Africa Electrification Initiative   |
| P116419<br>AFREA publication                                 | AFR             | Wood-Based Biomass Energy Development for Sub-Saharan Africa   Issues and Approaches   | Klas Sander, Besnik Hyseni, Waqar Haider  |
| P124811<br>ESMAP brochure                                    | Brazil          | TRACE   Energy Efficiency Opportunities in Belo Horizonte  | Pedzi Makumbe   |
| P123996<br>WB Directions in Development<br>978-0-8213-8987-4 | China           | Sustainable Low Carbon City Development in China   | Axel Baeumler, Ede Ijjasz-Vasquez, Shomik Mehndiratta                             |
| P110557, P117917   | China           | Urban Accessibility Planning Support Systems with a Case Study in Wuhan, China   | Prepared by University of Twente for Shomik Mehndiratta, Ke Fang, Andrew Salzberg |
| ESMAP White Paper  | Ghana           | Energy Access and Productive Uses for the Urban Poor   Final Report on Ghana Scoping Study                                       | Prepared by The Energy and Resources Institute (TERI) for ESMAP                   |
| P125354<br>ESMAP Technical Report 001/12                     | Global          | A Primer on Energy Efficiency for Municipal Water and Wastewater Utilities   | Feng Liu, Alain Ouedraogo, Seema Manghee, Alexander Danilenko                     |
| ESMAP brochure   | Global          | Energy Access   Supporting Access to Modern, Sustainable Energy Services   | Yvette Bossman  |
| ESMAP brochure   | Global          | Energy Sector Management Assistance Program   A Bridge to a Sustainable Energy Future  | Nicholas Keyes  |

(continued on next page)

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| <b>ISBN, Pub. No.,<br/>Or Project ID</b>                      | <b>Country/<br/>Region</b> | <b>Title</b>  | <b>Author/PTL/Program</b>                                       |
|---|----------------------------|---|---|
| Administrative Report   | Global                     | ESMAP Annual Report 2011  | Nicholas Keyes  |
| P119918<br>ESMAP Briefing Note 10/11                          | Global                     | Guidance Note   Best Operational and Maintenance Practices for City Bus Fleets to Maximize Fuel Economy                     | Ranjan Bose   |
| P127172<br>Executive Summary                                  | Global                     | Handbook on Planning and Financing Geothermal Power Generation   Main Findings and Recommendations                          | Magnus Gehringer, Victor Loksha                                 |
| ESMAP White Paper   | Global                     | Improving Energy Access to the Urban Poor in Developing Countries   | Prepared by The Energy and Resources Institute (TERI) for ESMAP |
| P120447<br>ESMAP Knowledge Product                            | Global                     | Innovative Approaches to Energy Access for the Urban Poor   Summaries of Best Practices from Case Studies in Four Countries | Yvette Bossman  |
| ESMAP 2-pager   | Global                     | MACTool   Marginal Abatement Cost Tool  | Christophe de Gouvello  |
| ESMAP 2-pager   | Global                     | Results-Based Approaches in the Energy Sector   | Oliver Knight   |
| P113129   | Global                     | Revisiting Policy Options on the Market Structure in the Power Sector   | Maria Vagliasindi, John Besant Jones                            |
| ESMAP 2-pager   | Global                     | Sustainable Energy for All   ESMAP Program in Support of Universal Energy Access  | Venkat Putti  |
| P119918<br>Report No. 63116-GLB<br>ESMAP White Paper          | Global                     | Transit Bus Operational and Maintenance Practices to Maximize Fuel Economy  | Ranjan Bose   |
| P083898<br>Oxford University Press India<br>978-0-1980-7835-7 | India                      | Cleaner Hearths, Better Homes   Improved Stoves for India and Developing World  | Douglas F. Barnes, Priti Kumar, Keith Openshaw                  |

(continued on next page)



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| ISBN, Pub. No.,<br>Or Project ID   | Country/<br>Region | Title  | Author/PTL/Program  |
|--|--------------------|--|---|
| P101555<br>ESMAP Briefing<br>Note 006/11                                   | India              | Energy Intensive Sectors of the<br>Indian Economy   Path to Low<br>Carbon Development                          | Kwawu Mensan Gaba,<br>Charles Joseph Cormier,<br>John Allen Rogers  |
| P101555<br>54607-IN<br>ESMAP White<br>Paper                                | India              | Energy Intensive Sectors of the<br>Indian Economy   Path to Low<br>Carbon Development                          | Kwawu Mensan Gaba,<br>Charles Joseph Cormier,<br>John Allen Rogers  |
| P122924<br>Report No.<br>63551-JO  | Jordan             | Developing an Energy-Efficient<br>Urban Transport Plan for<br>Zarqa City Downtown Area                         | Prepared by WSP,<br>Consolidated Consultants,<br>TRL for Michael Jordanou,<br>George Burnett, Eppa<br>Hummerstone |
| P118280  | LCR                | Drilling Down on Geothermal<br>Potential   An Assessment for<br>Central America                                | Xiaoping Wang   |
| P118730<br>Energy and Mining<br>Sector Board<br>Discussion Paper<br>No. 24 | MNA                | Regulatory and Financial<br>Incentives for Scaling Up<br>Concentrated Solar Power in<br>Developing Countries   | Natalia Kulichenko, Jens<br>Wirth   |
| P123396  | Moldova            | Chişinău Heat and Electricity<br>Supply Institutional and<br>Financial Restructuring Study<br>  Phase 2        | Prepared by Economic<br>Consulting Associates for<br>Shinya Nishimura   |
| P122960  | Nepal              | Evaluation of Pilot CFL<br>Distribution Program and<br>Capacity Building                                       | Prepared by Energy Consult<br>for Michael Haney   |
| P123643  | Peru               | Promoting Productive Uses of<br>Electricity in Rural Areas of<br>Peru   Experience and Lessons<br>Learned      | James Finucane, V. Susan<br>Bogach, Luis E. Garcia,<br>Eduardo H. Zolezzi   |
| P115164<br>ESMAP Briefing<br>Note 009/11                                   | Poland             | Transition to a Low Carbon<br>Economy in Poland  | Erika Jorgensen, Leszek<br>Kasek, Ryszard Malarski,<br>Ewa Korczyk, John Allen<br>Rogers, Gary Stiggins           |
| P112754<br>978-966-8869-47-5   | Ukraine            | Modernization of the<br>District Heating System in<br>Ukraine   Heat Metering and<br>Consumption-Based Billing | Yadwiga Semikolenova,<br>Lauren Pierce, Denzel<br>Hankinson   |

## ACRONYMS

|                 |  |
|-----------------|--|
| ABG             | annual block grant   |
| ACCES           | Africa Clean Cooking Energy Solutions initiative             |
| AEI             | Africa Electrification Initiative                            |
| AFD             | Agence Française de Développement                            |
| AFR             | Africa (World Bank region)                                   |
| AFREA           | Africa Renewable Energy and Access Program                   |
| AMANDER         | Agency for Household Energy and Rural Electrification (Mali) |
| AOSIS           | Alliance of Small Island States                              |
| ASER            | Agence Sénégalaise d'Électrification Rurale                  |
| AusAID          | Australian Agency for International Development              |
| BEIA            | Biomass Energy Initiative for Africa                         |
| CASE            | Clean Air Sustainable Environment Project                    |
| CDKN            | Climate and Development Knowledge Network                    |
| CEIF            | Clean Energy Investment Framework                            |
| CENER           | National Renewable Energy Centre (Spain)                     |
| CFL             | compact florescent lamp                                      |
| CG              | Consultative Group   |
| CIFs            | Climate Investment Funds                                     |
| CO <sub>2</sub> | carbon dioxide   |
| COP             | Conference of Parties  |
| CSP             | concentrated solar power                                     |
| CSIRO           | Commonwealth Scientific and Industrial Research Organisation |
| CTF             | Clean Technology Fund  |
| DFID            | Department for International Development (UK)                |
| DRC             | Democratic Republic of Congo                                 |
| EAP             | East Asia and Pacific (World Bank region)                    |
| EASP            | Energy Assessments and Strategy Program                      |

|          |   |            |  |
|----------|---|------------|--|
| ECA      | Europe and Central Asia (World Bank region)                       | ICLEI      | International Council for Local Environmental Initiatives                |
| ECOWAS   | Economic Community of West African States                         | ICT        | information and communication technology                                 |
| ECREEE   | ECOWAS Regional Centre for Renewable Energy and Energy Efficiency | IDTR       | Decentralized Infrastructure for Rural Transformation Project            |
| ECSEE    | Energy Community of South East Europe                             | IFC        | International Finance Corporation  |
| EDAP     | Energy Development and Access Project                             | ISCC       | integrated solar combined cycle  |
| EECI     | Energy Efficient Cities Initiative                                | ISEE       | International Society for Ecological Economics                           |
| EFFECT   | Energy Forecasting Framework and Emissions Consensus Tool         | kWp        | kilowatt peak  |
| ESMAP    | Energy Sector Management Assistance Program                       | KNUST      | Kwame Nkrumah University of Science and Technology                       |
| ESMED    | Energy Small and Medium Energy Development                        | LCR        | Latin America and Caribbean (World Bank region)                          |
| EUEI     | European Union Energy Initiative                                  | LCR-RNet   | International Research Network for Low Carbon Societies                  |
| EUEI-PDF | European Union Energy Initiative Partnership Dialogue Facility    | LED        | light-emitting diode   |
| GACC     | Global Alliance on Clean Cookstoves                               | M&E        | monitoring and evaluation  |
| GDP      | gross domestic product  | MACTool    | Marginal Abatement Cost Tool   |
| GEDAP    | Ghana Energy Development and Access Project                       | MDTF       | Multi-Donor Trust Fund   |
| GEF      | Global Environment Facility                                       | META       | Model for Electricity Technology Assessment                              |
| GGDP     | Global Geothermal Development Plan                                | MNA        | Middle East and North Africa (World Bank region)                         |
| GHG      | greenhouse gas  | MSETCL     | Maharashtra State Electricity Transmission Corporation Limited           |
| GIS      | geographic information systems                                    | MW         | megawatt   |
| GIZ      | Deutsche Gesellschaft für Internationale Zusammenarbeit           | NGO        | non-governmental organization  |
| GPOBA    | Global Partnership on Output-Based Aid                            | PGE        | Pertamina Geothermal Energy  |
| GW       | gigawatt  | PLN        | Perusahaan Listrik Negara (State Electricity Company, Indonesia)         |
| HEAT     | Hands-on Energy Adaptation Toolkit                                | PPIAF      | Public-Private Infrastructure Advisory Facility                          |
| HOMER    | energy modeling software for hybrid renewable energy systems      | PPP        | public-private partnerships  |
|          |   | PRODEGE II | Second Sustainable and Participatory Energy Management Project (Senegal) |

|           |  |           |  |
|-----------|--|-----------|--|
| PROMEF    | Power Sector Efficiency Enhancement Project            | SE4All    | Sustainable Energy for All                     |
| PV        | photovoltaic   | SIDS      | Small Island Developing States                 |
| REEP      | Renewable Energy Education Project (West Africa)       | SIDS DOCK | Small Island Developing States Support Program |
| RERED     | Rural Electrification and Renewable Energy Development | STEG      | Société Tunisienne de l'Électricité et du Gaz  |
| RETScreen | clean energy project analysis software                 | TA        | technical assistance                           |
| RREA      | Rural Renewable Energy Agency                          | TAG       | Technical Advisory Group                       |
| SAR       | South Asia (World Bank region)                         | TERI      | The Energy and Resources Institute             |
| SARESS    | South Asia Regional Electricity Study Series           | TRACE     | Tool for Rapid Assessment of City Energy       |
| SDN       | Social Development Network, World Bank                 | UNDP      | United Nations Development Program             |
|           |  | WBG       | World Bank Group                               |

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