## ENERGY SECTOR MANAGEMENT ASSISTANCE PROGRAM ANNUAL REPORT 2017





## **TABLE OF CONTENTS**

02	CHAPTER 1
	<b>ENERGY TRANSFORMATION IS HAPPENING</b>
10	CHAPTER 2  GOVERNANCE, MARKETS & PLANNING
	COVERNATOE, MARKETO & LANGING
14	CHAPTER 3
	<b>ENERGY ACCESS</b>
24	CHAPTER 4
	RENEWABLE ENERGY
28	CHAPTER 5
	ENERGY EFFICIENCY
30	CHAPTER 6
	ENERGY SUBSIDY REFORM
34	CHAPTER 7
	SEFORALL KNOWLEDGE HUB
40	CHAPTER 8
	SMALL ISLAND DEVELOPING STATES (SIDS)
43	CHAPTER 9
	FINANCIAL OVERVIEW

# ENERGY TRANSFORMATION IS HAPPENING



#### The global energy sector is at a turning point.

Dramatic reductions in the cost of renewables are enabling countries to think differently about meeting energy demand, and are creating new opportunities and challenges. Progress on energy efficiency is gaining momentum. Technological advancements in grid and off-grid solutions are enabling countries to roll out more innovative plans to increase access to electricity. While significant progress has been made, the 2017 Global Tracking Framework indicates that the pace of this progress

fell short of what is needed to meet the Sustainable Development Goal on energy (SDG7) that calls for access to affordable, reliable, sustainable and modern energy for all by 2030. Almost 10% of the world will still not have electricity access in 2030, while 28% will remain without access to clean cooking. Much more encouraging than the global trends, however, are the experiences of individual countries demonstrating the feasibility of moving faster toward sustainable energy objectives.



- Fixing sector fundamentals, including energy pricing: Helping energy suppliers become operationally effective and financially creditworthy, tackling weak governance, strengthening policy and regulatory frameworks, and reforming energy subsidies for improved sector performance.
- Pursuing all energy supply options for sustainability: Supporting countries to transition to lower carbon and more resilient energy systems, with a focus on de-risking investments and integrating variable renewable energy into power grids.
- Getting incentives and policy frameworks right for universal access: Assisting governments to develop and finance sound, comprehensive grid and off-grid electricity and household energy access programs that can leverage public and private financing.

- Prioritizing energy efficiency improvements: Working at the nexus of power, water, transport, buildings, industry and urban development to help countries take policy action on regulatory standards and implement delivery and financing modalities for energy efficiency investments, particularly in cities.
- Crowding in commercial capital and private sector solutions for delivery: Assisting countries to develop and implement appropriate legal, fiscal, and contractual frameworks, strengthen regulatory institutions, and adopt market-driven principles to attract adequate commercial capital to meet their energy sector investment needs.

Fiscal Year (FY) 2017 was the first year of implementation of ESMAP's four-year business plan for FY2017-2020. Progress was made across the three main thematic areas, corresponding to the SDG7 targets on **energy access**, **renewable energy**, and **energy efficiency**, as well as the cross-cutting areas of **energy markets**, **governance and planning**, **energy subsidy reform**, and **knowledge tools** that aim to tackle broader sectoral issues.

### **FY17 BY THE NUMBERS**

- The World Bank approved 41 new energy lending projects
  - 20 of these new projects, benefited from ESMAP support. Another 7
- projects in other sectors were also influence by ESMAP
- ESMAP's portfolio of advisory services and analytics informed **6.1**BILLION US\$ in World Bank lending
- ESMAP also leveraged approximately 425 MILLION US\$ from other sources such as governments, other multilateral organizations, and the private sector
- ESMAP initiated **95 NEW ACTIVITIES** in 53 countries (excluding regional activities) and **10 GLOBAL ACTIVITIES**, for a total of **25.7 MILLION** US\$ (excluding SIDS-DOCK Small Island Developing States)

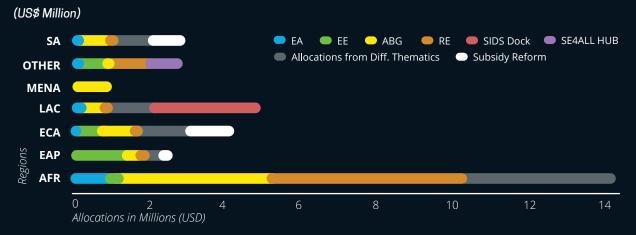
#### **NEW ACTIVITIES\***

- **15 in Energy Access** for \$3 million
- **26 in Renewable Energy** for \$7 million
- **21 in Energy Efficiency** for \$3 million
- 44 in Governance, Markets & Planning for \$9 million
- 8 in Energy Subsidy Reform for \$3 million
- 3 in SEforALL Knowledge Hub for \$0.8 million

#### FY17 approvals, grant amount by region



#### FY17 ESMAP & SIDS Approvals, Grant Amount by Thematic / Cross-Cutting



<sup>\*</sup> Activities may include multi-thematic grants.

#### **Key Trends in ESMAP's Portfolio**



#### **SECTOR-WIDE ENGAGEMENTS**

#### Long-term, sector-wide engagements can be transformational

In **Kenya**, ESMAP addressed energy challenges through policy assistance and planning tools across the full value chain of the sector over several years. The support is focusing on (i) *environmental sustainability*, where ESMAP's national geothermal strategy aims to increase generation capacity with renewable energy; (ii) *social sustainability*, where ESMAP's geospatial planning, multi-tier framework survey, and power demand studies are instrumental in helping increase electrification in poor urban areas and remote areas; and (iii) *financial sustainability*, where ESMAP's implementation roadmap is focusing on cost-recovery tariffs, guarantee programs and better borrowing terms for the private sector. As a result, Kenya scaled up geothermal energy development, increased electricity access for the urban poor, and embarked on an intensive effort to electrify remote communities to reach universal energy access by 2030.



#### **SECTOR FUNDAMENTALS**

#### Getting sector fundamentals right can maximize finance for development

In **Armenia**, ESMAP supported the Power Sector Financial Recovery Plan, which helped identify the shortcomings of the sector's regulatory framework. The government acted upon the recommendations of the plan to: (a) improve the tariff-setting methodology for state-owned power sector companies, (b) eliminate shortcomings in the methodology for adjustment of distribution tariff for private power distribution company (Electric Networks of Armenia, ENA), and (c) legally prohibit non-core business activities of state-owned power companies. This was and remains an essential element for attracting commercial financing into power generation given that ENA is the buyer of electricity, and needs to have financial stability. ESMAP is also supporting the development of a distribution grid code, including connection requirements for the 50 MW Masrik-1 solar PV plant, the country's first utility-scale solar power project, which is the first competitively tendered project in the Armenian power sector. The project will be fully financed on a private basis, with potential support from the World Bank and Scaling Up Renewable Energy Program (SREP) guarantees.



#### **ENERGY ACCESS**

#### Comprehensive electrification approaches can help increase energy access

Experience from several countries such as Rwanda, Afghanistan and Cambodia shows that making more determined use of off-grid and mini-grids solutions in combination with sustained grid electrification may make it possible to accelerate access rates. Geospatial least-cost electrification plans in Kenya and Myanmar have provided the blue-print for national electrification programs and are being used to target investments, including in mini-grid and off-grid systems. The package of support to countries includes integration of mini-grids and off-grid solutions into national electrification strategies, addressing policy and regulatory barriers for the private sector, and setting up financing facilities to support off-grid energy companies.



#### **RENEWABLE ENERGY**

## De-risking and improving public sector planning can incentivize private investors to enter the renewable energy sector

ESMAP's work in renewable energy aims to help countries attract the financing needed to achieve their Nationally Determined Contributions. ESMAP's Global Geothermal Development Plan helped leverage a \$350 million project in **Turkey** to scale up private sector investment for geothermal development by reducing investors' risks during drilling. ESMAP also launched the **Global Solar Atlas** — a free, web-based tool that allows policymakers to identify the best areas for solar power generation, and provides a quick tool to support commercial developers.



#### **ENERGY EFFICIENCY**

## A cross-sectoral approach to urban energy efficiency can improve city services and competitiveness

Integrating energy efficiency in the urban, transport, and water sectors helps build sustainable cities. In **Argentina**, ESMAP is supporting the \$200 million World Bank Metropolitan Buenos Aires Urban Transformation Project aimed at improving housing and electricity access to Buenos Aires' urban poor. Special focus was placed on building design, based on IFC's **Excellence in Design for Greater Efficiencies** (EDGE) Green Building program with a view to improving the resource efficiency of low income housing.



#### **ENERGY SUBSIDIES**

#### Reforming energy subsidies is a political economy challenge

Success in energy subsidy reform requires governments to communicate why reforms are needed and that there is a real offer in terms of social policy. For example, Ukraine was able to complete rapid increases in residential heat tariffs, virtually removing price subsidies, by shifting to a social protection scheme that provides heating subsidies to households according to set norms. This shift was accompanied by a major communications campaign. Because energy subsidy reforms are not just about prices, ESMAP's support to countries has been comprehensive, based on analysis of energy sector, fiscal issues, political economy, incidence analysis and social protection systems.



#### DATA

#### Strong data can shape policies and mobilize investment

Under the SEforALL Knowledge Hub, ESMAP launched three comprehensive data and analytical tools to help governments craft policies that attract investment and track progress toward SDG7. These include the Regulatory Indicators for Sustainable Energy (RISE), the Global Tracking Framework (GTF), and the State of Electricity Access Report (SEAR). New surveys under the Multi-Tier Framework for Energy Access (MTF) for measuring energy access are underway. The final MTF report will be launched in 2018. These tools have helped inform the World Bank's policy engagements in client countries.

#### **ESMAP AND CLIMATE CHANGE** How ESMAP Supports Implementation of Country NDCs

#### RENEWABLE ENERGY

#### 48 out of the 53 countries

ESMAP supports, have included RE as part of their NDCs:

- 34 specify solar energy as a priority in their NDCs
- 25 specify wind energy as a priority in their NDCs
- 12 specify geothermal energy as a priority in their NDCs

#### **URBAN ENERGY EFFICIENCY**

#### 18 out of the 20 countries

ESMAP supports have included EE as part of their NDCs:

- 10 specify EE cities as a priority
- 9 specify EE buildings as a priority

#### **ENERGY SUBSIDIES**

## 5 out of the 14 countries

ESMAP supports mention fossil fuel subsidy reform: China, Egypt, India, Nigeria, and Vietnam



FY2017 marked the shift of ESMAP's gender work from a stand-alone activity supporting program activities to an initiative fully integrated across ESMAP's portfolio. A series of activities are now assessing gender dimensions in areas such as electricity infrastructure, geothermal, mini grids, energy efficiency, behavior change, and clean cooking. In addition, three new regional Gender and Energy programs were established in ECA, LAC, and MNA following the models and approaches of the AFR and EAP Gender and Energy programs. The Africa Gender and Energy program currently supports 35 energy projects in 13 countries (Benin, Comoros, Côte d'Ivoire, Democratic Republic of Congo, Ethiopia, Kenya, Liberia, Niger, Nigeria, São Tomé and Príncipe, Senegal, Tanzania, and Uganda). In FY2017, the World Bank's Board approved 10 projects that received gender technical assistance from ESMAP.

#### **RENEWABLE ENERGY**

ESMAP collaborated with the Government of Iceland, the United Nations University Geothermal Training Programme (UNU-GTP) and the Gender Equality and Studies Training Programme (UNU-GEST) to initiate a study on incorporating gender in geothermal energy. In addition, ESMAP's support to **Vietnam's Trung Son Hydropower Project** demonstrated how gender-informed resettlement can contribute to the project's success.

#### **ENERGY EFFICIENCY**

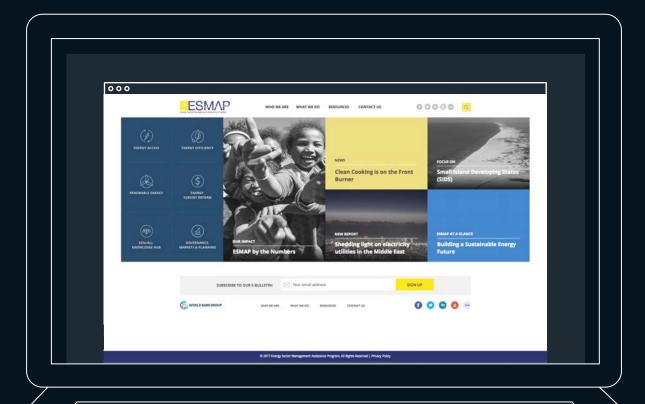
A guidance note on Energy Efficiency, Behavior Change and Gender is being prepared to help enhance the effectiveness of demand-side, energy efficiency programs by integrating the gender dimension throughout the project cycle and developing gender-informed communication strategies. In **Bangladesh**, analysis of accessibility planning for public transport in Dhaka is opening doors for women and vulnerable groups.

#### **ENERGY ACCESS**

In **Liberia**, ESMAP is supporting the Rural and Renewable Energy Agency (RREA) to identify opportunities for men and women in the development of the mini grid in Lofa County, under the Liberia Renewable Energy Access Project. Staff training increased awareness and capacity on topics such as gender norms and productive uses of energy. In addition, RREA adopted a gender policy and sexual harassment plan. At the policy level the Liberia Rural Energy Strategy and Master Plan for Liberia (RESMP) included a cross cutting focus on gender to highlight how energy poverty impacts women and girls lives and other aspects. A Gender and Mini Grids guidance note was presented at the ESMAP Learning Event on Upscaling Mini Grids for Least-Cost and Timely Access to Electricity Services in Myanmar. Gender is also being integrated into MTF modules is several countries.

ESMAP is engaged with SEforALL's new People-Centered Accelerator to support gender equality, social inclusion, and women's empowerment.

#### **NEW ESMAP WEBSITE LAUNCHED**



To support the continuous sharing of knowledge and communicate progress and results, ESMAP launched a new, dynamic and comprehensive website. The site is structured in a way to better serve the information needs of diverse audiences globally. It provides a rich source of information delivered through news, stories, multimedia, blogs, videos, knowledge products, online courses, publications and technical reports. It contains information about ESMAP's role in catalyzing change within the World Bank Group by leveraging billions of dollars of World Bank investments in energy and generating @ESMAPKnowledge that shapes global energy policy.



#### **FOLLOW ESMAP-RELATED NEWS ON TWITTER:**

@WBG\_Energy #ESMAPKnowledge

#### **CHAPTER 2**

## GOVERNANCE, MARKETS & PLANNING

Getting sector fundamentals right can help mobilize private financing. Good governance and fiscal management, sound planning, and well-designed market mechanisms can help countries improve the financial health of their utilities and attract the investment capital needed to develop their energy sectors sustainably. ESMAP leverages the World Bank's sector-wide engagement with countries to provide strategic support in market and regulatory reform, power system planning, and integration of regional infrastructure.

In FY2017, ESMAP allocated over \$9 million to help countries improve governance, planning, and market structures in the energy sector. Activities have resulted in significant policy shifts and informed billions in World Bank investments.

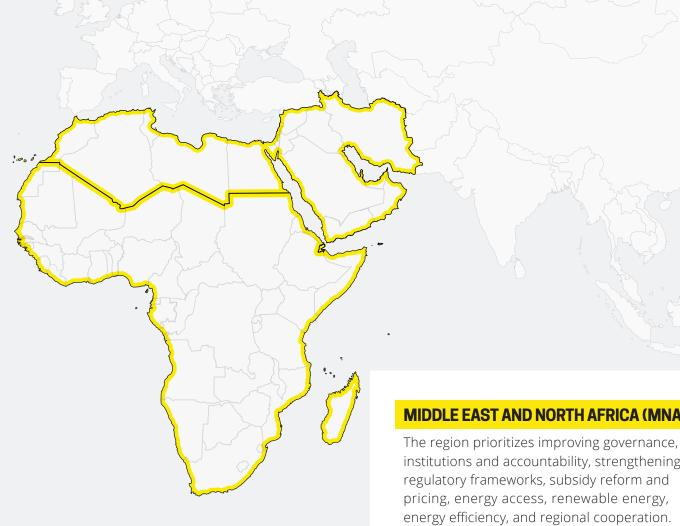


#### **Responding to Regional Priorities**



## LATIN AMERICA AND CARIBBEAN (LCR):

The region prioritizes strengthening energy policies, addressing energy equity and quality of access, enhancing the climate resilience of energy systems, scaling up financing and promoting a new public-private economy. The LAC regional study on Energy Markets helped generate new knowledge by presenting an integrated view of energy sector trends in LAC, energy markets performance, trends in emerging technological disruptions, and status of financial markets.



#### **AFRICA:**

The region's priorities include strengthening utilities, regulation and power system planning, regional integration of infrastructure, renewable energy scale up (particularly hydropower and solar), grid and off grid electricity, and facilitating private sector investment. In **Kenya**, ESMAP has helped to strengthen country capacity to transition to a competitive wholesale market and enhanced the Energy Regulatory Commission's capacity to undertake a regulatory impact assessment. In Madagascar, technical assistance helped "prepare standard power purchase and concession agreements, as well as safeguard frameworks for small hydropower independent power producers (IPPs). This has informed the government on competitive processes for the development of small hydropower with private sector investment.

#### **MIDDLE EAST AND NORTH AFRICA (MNA):**

institutions and accountability, strengthening regulatory frameworks, subsidy reform and pricing, energy access, renewable energy, energy efficiency, and regional cooperation. The Pan-Arab Regional Trade Platform was established with the help of ESMAP and other partners to address the regulatory, governance, pricing, and financing challenges affecting regional energy trade and infrastructure integration. Since its launch, significant research and analysis was undertaken to assess gas trade in the region and provide inputs on the political economy of regional cooperation. ESMAP's study on Securing Energy for Development in the West Bank and Gaza broke new ground by identifying options for diversifying energy supply to help West Bank and Gaza meet their growing energy demand by 2030 amidst high political and economic uncertainty. Scaling up renewable energy to diversify supply was one of the study's key recommendations. It also proposed innovative methods to help utilities minimize losses and create a conducive environment for private sector investment in power generation. An upcoming World Bank investment project in being prepared based on these findings.



## EASTERN EUROPE AND CENTRAL ASIA (ECA):

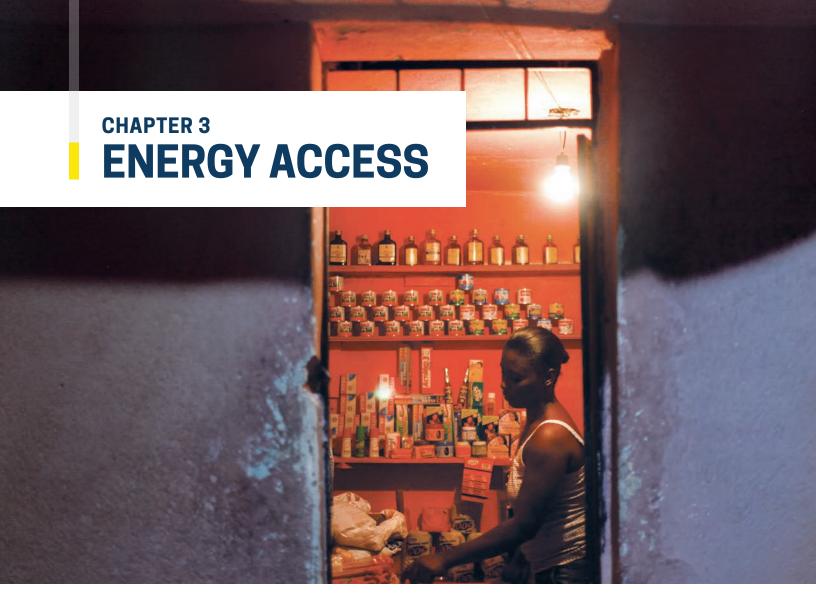
The region's priorities include improving access to reliable and efficient energy supply, designing sustainable tariff and subsidy reforms, scaling up energy efficiency and renewable energy, and strengthening legislation for the electricity and gas sectors. In Moldova, technical studies on power interconnection with Romania informed the preparation of a new World Bank investment project. This work has enabled the Moldovan government, the World Bank and other donors, such as the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), and the European Union Neighbourhood Investment Fund, to agree on a \$270 million financing package arrangement, including \$70 million IDA financing. In **Albania**, ESMAP support for power market design helped establish a competitive, transparent and price-efficient electricity market. This has helped attract investors for an upcoming private 280-MW merchant hydropower project.

#### **EAST ASIA AND PACIFIC (EAP):**

Priority areas range from strengthening power sector governance, and creating competitive markets, to power and gas regulatory reforms, energy efficiency and variable renewable energy integration, and energy infrastructure. ESMAP helped **Electricity of Vietnam** (EVN), the major power utility in the country, to develop a comprehensive strategy and roadmap for unbundling and divesting its generation assets, with a view to creating a more favorable environment for private sector investment, including a timeline for the launch of IPO/ strategic investor transactions. In Indonesia, ESMAP supported the development of the Matenggeng Pumped Storage Hydroelectric Power Project through an analysis of catchment issues, as well as local benefit sharing mechanisms in the Poko Hydropower Project.

#### **SOUTH ASIA (SAR):**

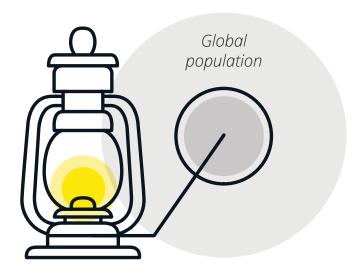
Regional priorities include renewable energy, energy efficiency, access to energy, as well as regional integration. ESMAP informed **India**'s \$240 million Andhra Pradesh 24x4 Power4All project in terms of upgrading information technology systems in utility companies and has also facilitated discussions on the overarching architecture for smart grid deployment. In **Bangladesh**, ESMAP analysis on options for scaling up power trade between Bangladesh and India including the establishment of a Bangladesh Power Exchange, informed the government, the regulator, and system operator on the requirements for participating in a power market, with India initially, and later with other countries.



"

Pace of progress on the sustainable energy goal on energy access fell short of what is needed to meet global objectives by 2030. Almost 10% of the world will still not have electricity access in 2030, while more than 25% will remain without access to clean cooking. Substantial acceleration of efforts and investments are needed.

— Global Tracking Framework (GTF), 2017



1.06 BILLION WITHOUT ELECTRICITY

In addition, the **State of Energy Access Report** (SEAR), found that in countries with low levels of electricity access, both grid and off-grid solutions are vital for achieving universal access but they must be supported by the right policies, regulations, and incentives.

ESMAP's comprehensive approach encompasses strategies, which integrate grid extension, off-grid solutions such as mini grids, and systems to power individual homes and businesses in both rural and urban areas, including urban slums. It also helps countries to scale up access to modern and clean cooking solutions, including clean fuels.

#### **Bridging the Access Gap with Mini Grids**

Technological innovations and new business models are making mini grids a scalable option for expanding energy services in low access areas like Sub-Saharan Africa, parts of South Asia, and Small Island Developing States. ESMAP's Global Facility on Mini Grids incorporates mini grids into World Bank investment projects, shares global knowledge, builds local capacities, and leverages partnerships.

#### **CURRENTLY:**

**27** 

534
MILLION US\$

Expected to operationalize close to

1,000

#### **WORLD BANK ELECTRIFICATION**

**PROJECTS** under preparation or implementation in 23 countries include mini grids.

## OF WORLD BANK FUNDS TO SUPPORT THE MINI GRID COMPONENTS,

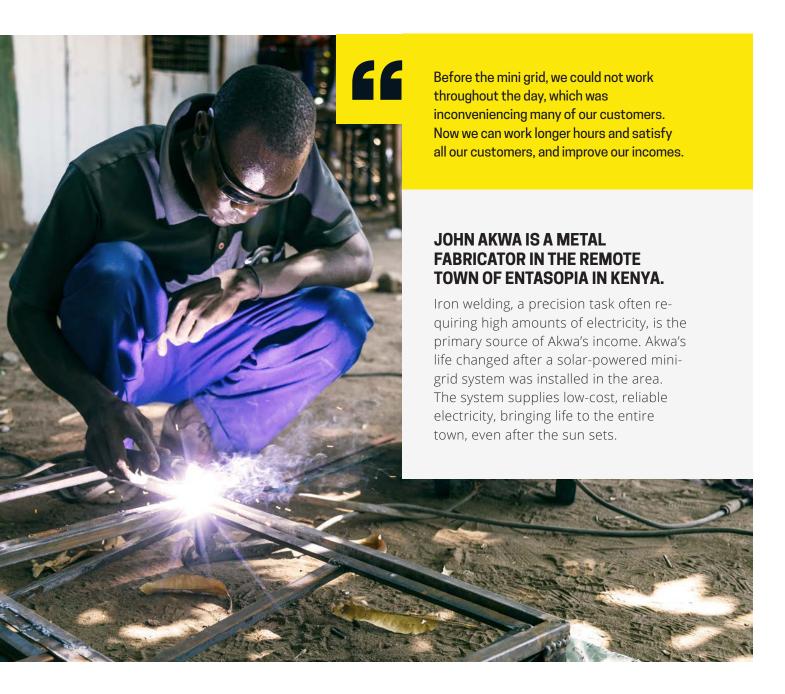
leveraging an additional \$830 million in co-financing for mini grids from governments and the private sector.

**NEW OR HYBRIDIZED MINI GRIDS BY 2024**, that will improve access to

electricity for over 2.5 million people.

#### **KENYA:**

ESMAP's five-day learning event on Upscaling Mini Grids for Low Cost and Timely Access to Electricity in Nairobi informed the emerging policy consensus on mini grids as a low cost, off-grid electricity option. In addition, the ESMAP report, Current Activities and Challenges to Scaling up Mini Grids in Kenya, informed the off-grid electrification component of the World Bank's Electricity Modernization Project in Kenya and will benefit a forthcoming off-grid solar access project by identifying the challenges facing private mini grid developers in the country.





#### **MYANMAR:**

ESMAP's analytical work on the role of mini grids to increase electrification rates, an assessment of informal mini grid operations, and a roadmap for scale-up, informed the implementation of the mini grid component of the World Bank \$400 million National Electrification Project (NEP). The project is set to leverage \$7 million in IDA funding and an additional \$7 million from the Myanmar government to support the development of over 150 private sector mini grids. Already, the NEP is lighting up the lives of about 700,000 people in rural Myanmar. ESMAP has been a partner to Myanmar since the beginning of the government's effort to provide electricity to its entire population. ESMAP also hosted a learning event on Upscaling Mini Grids for Least Cost and Timely Access to Electricity Services in Nay Pyi Taw.

#### **NIGER:**

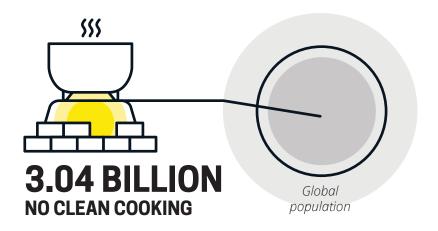
ESMAP's feasibility studies helped identify energy supply options to define investment for mini grids in a \$49 million World Bank investment project to bring electricity to remote, rural populations.

#### **Lifting Barriers to Slum Electrification**

Bringing safe and sustainable energy to the poor living in urban slums is not only critical for reducing poverty in these communities, but also for achieving universal access by 2030 given growing urbanization rates. These communities often lack access to legal, safe, and affordable electricity. Weak policy and regulatory frameworks often hinder the delivery of energy services in these areas.

In FY2017, ESMAP provided assistance to five World Bank lending operations in Argentina, Bangladesh, Dominican Republic, Ethiopia, and Jamaica to support improved electricity access for the urban poor. In addition, ESMAP consolidated knowledge and expertise of slum electrification initiatives around the world through a series of case studies on the cities of Nairobi, New Delhi, Rio de Janeiro, and São Paolo.

#### **Efficient Clean Cooking and Heating**



Nearly 2.9 billion people rely on wood or other biomass energy for cooking and heating. Every year, 4.3 million die from indoor air pollution, resulting in a social cost of about US\$123 billion. Investment needs to tackle the issue are estimated to be at least US\$4.4 billion annually.

Safe, affordable, and accessible clean cooking and heating solutions exist, but a robust global push is needed to accelerate their adoption.

In FY2017, the World Bank's efficient, clean cooking and heating portfolio consisted of more than \$130 million in IDA and IBRD lending and technical assistance. These programs are expected to reach 2.8 million households in 9 countries, including **Bangladesh**, **China**, **Djibouti**, **Ethiopia**, **Kyrgyzstan**, **Kenya**, **Mongolia**, **Senegal**, and **Uganda**. To date, they have benefited about 11 million people with access to cleaner, more efficient cooking solutions.

Much of this lending has been leveraged by ESMAP's work in Efficient, Clean Cooking and Heating (ECCH) which focuses on policy advice, strengthening the enabling environment for investment, and piloting innovative approaches to attract private sector funding to the sector.

Currently, ESMAP is supporting two World Bank regional programs in Africa and Central America, and 9 individual countries: **China**, **India**, **Indonesia**, **Kenya**, **Lao PDR**, **Nepal**, **Kyrgyz Republic**, **Tajikistan**, and **Uganda**.

#### SINCE ITS LAUNCH IN 2015, THE EFFICIENT, CLEAN COOKING AND HEATING INITIATIVE:

Informed

MILLION US\$

worth of investments in clean cooking in 5 World Bank projects which are **EXPECTED TO REACH 1,074,000 HOUSEHOLDS.** 

Mobilized

13
MILLION US\$

from the Inter-American Development Bank for projects in **GUATEMALA**, **NICARAGUA**, **AND HONDURAS** through the Central America Clean Cooking Initiative.

#### Piloting Innovative Solutions, Influencing Policies

- A results-based financing (RBF) pilot in Indonesia provided incentives to 10 private suppliers to distribute almost 10,000 clean cookstoves. Among these suppliers, eight are new to the sector and five are women-led businesses.
- In **Uganda**, the Distribution Challenge Fund, set up with help from a \$2.2 million ESMAP grant, is under implementation.
- New recommendations on **China**'s stove emission standards, testing protocols, and incentive mechanisms have been adopted by the Hebei province under the \$80 million clean stove component in the World Bank Hebei Air Pollution Prevention Program for Results Financing project.
- In Lao PDR, an RBF pilot aims to introduce 50,000 "super clean stoves," the most advanced gasifier stoves available that meet World Health Organization standards for indoor air quality. This is expected to incentivize donors and social investors to purchase the verified outcomes in climate, health, and gender benefits, which will attract upfront private financing.
- In Kyrgyzstan, capacity building efforts enabled local businesses to produce high-performance stoves, which saved about 50% in fuel and reduced emissions by more than 90%. This led to the \$46 million Heat Supply Improvement Project.

### FROM LIGHTING AFRICA TO LIGHTING GLOBAL

Building on the success of Lighting Africa, ESMAP expanded its support to Lighting Global — a platform through which the International Finance Corporation (IFC) and the World Bank coordinate with Global Off-Grid Lighting Association (GOGLA), manufacturers, distributors, governments and other partners to develop the modern off-grid energy market.

#### **RESULTS**

#### **LIGHTING AFRICA**

Catalyzes markets to deliver affordable, highquality off-grid lighting and energy products

- **20.5 MILLION** people in Africa are now meeting their basic electricity needs
- OVER 100 products have been verified
- Leveraged over **\$120 MILLION** in IDA and over **\$85 MILLION** from other financiers, with another **\$470 MILLION** in the pipeline for FY18 and FY19

#### **LIGHTING GLOBAL**

The World Bank Group's platform to promote the sustainable growth of the off-grid solar market.

- More than **116 MILLION** people have benefited from using quality verified solar lighting products
  - More than **34.5 MILLION** people have had their basic lighting needs met.
  - More than **23 MILLION** quality verified products have been sold since 2008
  - In 2016 alone, more than **1.7 MILLION** tons of GHG has been avoided due to the use of quality verified products instead of kerosene

Lighting Global aims to lower investment risk for the private sector and help governments strengthen the enabling environment for accelerating off-grid electrification. ESMAP supports Lighting Global by engaging with governments through World Bank projects and policy dialogue.

In FY17, ESMAP informed three World Bank approved projects with large off-grid components. Support focused on (i) policy — integrating off-grid solutions to electrification strategies; (ii) financing — setting up facilities for off-grid energy companies; (iii) product quality assurance; and (iv) capacity building and consumer education.



#### **NIGER:**

ESMAP support to the Solar Electricity Access Project helped to develop a line of Credit for standalone solar systems.

#### **ZAMBIA:**

ESMAP support to the Electricity Service Access Project helped to develop a line of credit for standalone solar systems. Lighting Africa supported the integration of off-grid solutions into the National Electrification Strategy.

#### **RWANDA:**

ESMAP support to the Renewable Energy Fund Project focused on Mini Grid and Off Grid businesses.



ESMAP also helped **Botswana**, **Burundi**, and **Somalia** to strengthen off-grid electrification approaches and helped **Ethiopia** implement a working capital facility. Just-in-time support was provided to World Bank teams in **Haiti**, **Myanmar**, **Pakistan**, **Philippines**, and **Vanuatu**. ESMAP also collaborated with GOGLA on two knowledge exchanges on unlocking solar capital in Nairobi and Singapore.

Increasingly, ESMAP has been promoting a pro-poor approach. It helps governments to set up financing facilities for off-grid energy companies and develop public-private partnerships to expand off-grid electrification to poorer, more remote areas where the commercial market alone cannot reach. Upcoming World Bank projects in Kenya and Pakistan will target the poorest, most marginalized communities.

#### **Sustainable Energy for All (SEforALL) Technical Assistance**

ESMAP'S Sustainable Energy for All (SEforALL) Technical Assistance focuses mostly on improved planning for electrification. This includes the development of least-cost electrification plans and investment prospectuses that can enable sector-wide approaches and the integration of grid expansion, mini grids, and individual off-grid solutions.

Phase I was finalized in FY2017, extending support to 11 countries. In **Myanmar**, the National Electrification Plan and the associated investment prospectus were adopted by the government and mobilized \$600 million in financing for grid and off-grid electrification. ESMAP helped Guinea develop a strategy for developing its electricity sector while in Mozambique, ESMAP support resulted in an adoption of the National Electrification Strategy. ESMAP also completed an investment plan for **Nepal** marking the development of a new roadmap for expanding clean cooking solutions, following similar roadmaps completed for **Guatemala** and **Honduras**.

Phase II is supporting the development of a global geospatial electrification planning platform in addition to specific country support across **10 countries in Africa** and in **Colombia**. In **Kenya**, the first comprehensive geospatial plan has informed the new National Electrification Strategy and is now being used to target rural investments, including in mini grids and off-grid systems in an upcoming World Bank project on off-grid solar access. In the **Democratic Republic of Congo**, ESMAP helped to identify viable electricity access projects and evaluated barriers to help private companies plan their engagement in the sector. This support helped move forward a \$145-million project to help expand access to electricity for 2 million people.

ESMAP also funded, in partnership with Sweden's KTH Royal Institute of Technology, the development of an open source tool for geospatial electrification planning for energy sector stakeholders. The first of its kind, the Electrification Pathways application builds on a state-of-the-art geospatial modeling algorithm to provide countries with a 'first pass' rapid planning tool informing universal electricity access strategies.



#### **CHAPTER 4**

## RENEWABLE ENERGY

The investment needed to help countries transition to a low carbon, climate resilient development is in the order of trillions, rather than billions of dollars. Mobilizing public and private sector resources is crucial. ESMAP's work in renewable energy focuses on de-risking exploration of geothermal resources to unlock financing for projects, assessing and mapping of resource potential to help governments and commercial developers make informed decisions and carry out initial prospecting, integrating variable renewable energy into grid systems, and scaling up solar power.

#### **Unlocking Financing for Geothermal Energy**

In FY2017 ESMAP's Global Geothermal Development Plan (GGDP) leveraged three new World Bank geothermal projects in **Chile, Indonesia**, and **Turkey** for a total of almost \$460 million.

- **Chile** mobilized a \$50 million Clean Technology Fund (CTF) grant though the Inter-American Development Bank to stimulate additional investment. An additional CTF grant of \$3 million will provide technical assistance on legal, social, and market barriers and contribute to the development of tradeable geothermal resources.
- Indonesia obtained a \$50 million CTF grant to mitigate risks in exploration drilling, as well as a \$6.25 million Global Environment Facility (GEF) grant for technical assistance and capacity building.
- **Turkey** secured approval for a \$350 million project to scale up private sector investment for geothermal development by reducing investors' risks during drilling.

## CHANGING THE COURSE OF GEOTHERMAL DEVELOPMENT

FROM 1975 - 2011

the share of financing for geothermal energy exploration was only about 6% out of the total multilateral financing.

FROM 2012 - 2017

the share of financing for geothermal energy exploration jumped to 29% — almost a third of the total multilateral investment in the sector.

**SINCE ITS LAUNCH IN 2013** 

GGDP mobilized US\$250 million of concessional financing for geothermal exploration activities. This is expected to leverage at least US\$1.5 billion in public and private capital.



In **Djibouti**, where a \$1.1 million ESMAP grant is already supporting the upstream development of geothermal resources, ESMAP brokered an \$18 million agreement between Électricité de Djibouti (EdD), the national electricity corporation, and Iceland Drilling Company for the drilling of two geothermal wells, two optional wells, and to confirm resource viability in Fiale Caldera.

Two major knowledge exchange events were hosted by ESMAP to share best practices in geothermal development. The GeoLAC 2017 Congress in Mexico City and the IGC Turkey 2017 in Ismir. ESMAP also organized a south-south knowledge tour in Indonesia to expose Tanzanian officials to the Indonesian experience in geothermal development.

#### Investing Where the Sun Shines and the Wind Blows

ESMAP's Renewable Energy Resource Assessment and Mapping helps countries understand their renewable energy resource potential to facilitate national planning, decreasing risks for developers and reducing costs. In FY17, ESMAP continued its support to 16 World Bank projects. **Indonesia** and **Madagascar** completed small hydro mapping and **Pakistan** completed both biomass and solar mapping. All outputs were disseminated to decision-makers through workshops and outreach. Solar measurement campaigns were initiated in the Maldives, Pakistan, and Zambia. All measurement data from these projects is now available on the new ENERGYDATA.INFO platform, the World Bank Group's repository for energy sector data and applications.

Interim renewable resource mapping results include:

- **Tanzania** small hydro mapping has identified 70+ unknown sites
- **Ethiopia** wind mapping results were used for wind power expansion
- Pakistan wind and solar maps released have highlighted huge resources in Balochistan with potential for development
- Vietnam wind mapping identified resources in the center and north of the country, which were not previously visible

#### Mapping Renewables Potential Can Strengthen Private Sector Confidence

- Global Solar Atlas launched in January 2017
   a free, web-based tool that supports
   strategic planning and site identification
- High resolution solar maps for all 146 developing countries
- Over 60,000 site visits from around the world (as of June, 2017), with non-OECD countries representing 16 of the top 25
- Measurement data has been shared with IRENA
- Setting the stage for the launch of a new Global Wind Atlas in FY2018



The World Bank is seeing a surge of interest from our clients in solar power as a result of the dramatic cost decreases over the past few years. We hope that the Global Solar Atlas will help inform the crucial planning and investment decisions that will need to be taken over the next decade to shift to more sustainable forms of energy.

 Riccardo Puliti | Senior Director, World Bank Energy & Extractives Global Practice

#### Integrating Renewable Energy into the Grid

ESMAP helps countries to increase the share of variable renewable energy (VRE) in their energy systems by ensuring that the grid can reliably evacuate and transmit power from renewable energy plants. Activities focus on grid modernization, adoption of new control and forecasting technologies, revamped business models for utilities, and updated policy and regulatory frameworks. In FY2017, ESMAP informed seven World Bank lending projects for \$670 million and five country planning strategies, including support for grid code development in Cabo Verde, Morocco, Armenia, Ukraine, Myanmar and Bangladesh.

In **India**, a study funded by ESMAP, in collaboration with the U.S. National Renewable Energy Laboratory (NREL) informed regulatory and policy decisions to help reach the country's ambitious 175GW renewable energy target by 2022. The first of its kind, the study brought together

views from over 150 technical experts from the public and private sectors and was recognized by the Minister of Energy as a significant step for India. It also helped build capacity through the development of a comprehensive modeling tool used by the National Load Dispatch Center and has informed a World Bank lending project on shared infrastructure for solar in Madhya Pradesh. In **Sri Lanka**, support for renewable energy planning and capacity building has helped the national utility, Ceylon Electricity Board (CEB), prepare Sri Lanka's long term generation expansion plan that includes renewable energy. As a result, CEB is now working with international financial institutions on several solar and wind projects. In addition, the World Bank's recommendations for improving sector planning have been integrated into Sri Lanka's domestic dialogue led by the regulator.

#### **Partnerships and Knowledge**

To further leverage resources, ESMAP maintains partnerships with the Global Sustainable Electricity Partnership (GSEP), Public-Private Infrastructure Advisory Facility (PPIAF), NREL, Clean Energy Ministerial, and the Children Investment Fund Foundation (CIFF).

An ESMAP-PPIAF Partnership on Climate Change was established to help countries transition to climate-resilient energy infrastructure . The joint support will leverage \$2.5 million of co-funding from PPIAF over 5 years to build enabling environments that facilitate deployment of variable renewable energy. In coordination with IFC, ESMAP also produced and launched the Energy Storage Market Report which shows that energy storage technology will become more accessible in emerging markets in the coming decade, enabling a significant scale-up of renewable energy.

ESMAP's collaboration with the Korea Green Growth Trust Fund (**KGGTF**) has leveraged an additional \$2.5 million for five activities:

- West Africa: assessment of the potential role of energy storage to enhance system operation, and to support VRE deployment and regional integration in the West Africa Power Pool
- Central America: development of a regional initiative to support dispatch centers in building VRE forecasting capacity and other technical methodologies, building on lessons learned from national integration studies for Guatemala and Honduras.
- Vietnam: preparation of large-scale and rooftop solar PV development
- Peru: a VRE integration study with an integrated approach of hydropower and gas for a more clean, efficient, and resilient power system
- **Sri Lanka**: renewable energy sector planning enhancement and capacity building

IN 2016, 74GW OF SOLAR CAPACITY was added globally.

#### **Deploying Solar Energy at Scale**

Demand from clients for support on deploying solar power grew rapidly in FY2017, and is now a major growth area in the World Bank's energy lending portfolio. The World Bank Group's Scaling Solar initiative already has active engagements in Ethiopia, Madagascar, Senegal, and Zambia. The World Bank has also initiated support for energy transitions in Asia.

In FY2017, ESMAP initiated nine new activities to support the World Bank's efforts and is starting to develop core expertise and knowledge on key issues, such as the transition to solar auctions, and deployment of rooftop solar. In **Vietnam**, ESMAP is developing a strategy to help the country achieve its target of 12GW of solar PV capacity installed by 2030, including a pilot solar auction. In **Indonesia**, ESMAP organized a workshop on solar auctions that laid the groundwork for discussion on competitive utility-scale solar PV auctions and the deployment of solar PV in the Eastern islands based on hybrid solutions with storage, and floating PV. Similarly, in **Myanmar**, ESMAP supported a workshop on floating solar to inform the use of this technology combined with hydropower plants in the country.

#### **CHAPTER 5**

## **ENERGY EFFICIENCY**

Cities consume more than two-thirds of global energy and produce about 70% of greenhouse gas (GHG) emissions. Buildings are also major consumers of energy and resources and account for about third of global GHG emissions. Making cities and buildings more energy efficient can help mitigate climate change and contribute to the achievement of the Sustainable Development Goals (SDGs), especially SDG7.

Through its work on **Energy Efficient City Services and Energy Efficient and Sustainable Buildings**, ESMAP collaborates with the urban, transport, and water sectors, as well as the International Finance Corporation (IFC) to help cities incorporate energy efficiency into their planning. ESMAP's cross-sectoral approach has enabled the integration of energy efficiency in upgrading building resilience, and in public transport and water supply systems.

In FY2017, ESMAP supported technical assistance for projects in **12 countries**, covering **19 cities**. Some of these include **Argentina** (Buenos Aires), **Brazil**, **China** (Anshan, Fushun, Fuxin, Gaizhou, Metropolitan Shanghai, Shenyang), **Kazakhstan** (Almaty, Astana), **Mongolia** (Ulaanbaatar), Panama (Panama City), **Ukraine** (Chernihiv, Dnipro, Kamianets-Podilsky, Kherson, Kharkiv, Mykolaiv, Odessa, Ternopil), and **Vietnam**.

## TRACE (Tool for Rapid Assessment of City Energy) Continues to Leverage Investment

Building on the lessons learned from the successful engagement with **Mexico**, TRACE diagnostics for **Uzbekistan**'s Kagan and Yangiyul cities laid the ground for an upcoming World Bank urban development project to scale up support to all 28 regional cities in the country. Similarly, TRACE diagnostics, complemented with action plans and pre-feasibility studies informed a \$71 million Integrated Urban and Tourism Development Project in **Albania**, which includes a \$750,000 investment for energy efficient street lighting retrofits in three cities. An updated version of the software was also completed in FY2017.

#### **Knowledge in Energy Efficiency**

- Six case studies and a synthesis report on Proven Delivery Models for LED Public Lighting share real-life experiences across cities.
- Assessing and Measuring the Performance of Energy Efficiency Projects is now offering practical guidance on how to implement monitoring and verification systems.
- An E-Learning Course on Energy Efficiency in Cities developed in collaboration with the World Bank Climate Group and the Online Learning Campus aims to help practitioners and policy-makers to design and implement city programs.



Dutch experience in designing energy efficient cities. Eight workshops in urban transport planning in Ahmedabad, Dubai, Johannesburg, Mexico City, Nairobi, Seoul, Singapore, and Washington D.C., reached nearly 400 participants. Funding is a major issue for many cities trying to scale up energy efficiency projects. As a response, ESMAP supported the design of financial mechanisms in several cities aiming to leverage significant private resources and climate funding. In Almaty and Astana, energy efficiency diagnostics and plans have led to a request to the World Bank to support the development of a public-private-partnership to implement the identified investments. ESMAP is also supporting the development of a financing mechanism to integrate energy efficiency in public buildings. In **Panama**, ESMAP supported an energy efficiency fund to finance investments and the development of appliance labelling standards and green building codes for improved energy efficiency performance codes at the national level.

In **Ukraine**, ESMAP's support to the \$272 million district heating energy efficiency project covering the seven largest cities outside of Kiev has expedited the speed of provision of efficient heating to residents.

In **Jamaica**, ESMAP helped to implement a machine learning model to help Jamaican utility,

Finally, ESMAP has partnered with the Global Alliance on Buildings and Construction launched at COP22 aiming to mobilize climate action. ESMAP's role focuses on helping developing countries realize the potential for their individual buildings and construction sectors while reducing global emissions, by sharing experiences and lessons on energy efficiency integration with other buildings-related sustainability aspects.

#### **ARGENTINA**

ESMAP is supporting the integration of energy efficiency in the \$200 million World Bank Metropolitan Buenos Aires Urban Transformation Project aimed at improving housing and electricity access for the city's urban poor.

#### FROM SLUMS TO NEIGHBORHOODS

Buenos Aires has made it a priority to transform this settlement, embarking on an ambitious plan not only to improve its living standards but to ensure a long-lasting social and urban integration with the rest of the city. The World Bank is providing technical assistance to achieve this goal, with support from the ESMAP.

## ENERGY SUBSIDY REFORM





Subsidies to fossil fuels constitute a **SIGNIFICANT FISCAL BURDEN** on government budgets and are a barrier to sustainable, climate smart development. They encourage overuse of fossil fuels, and deter private investment in renewables and energy efficiency.



In 2016, global subsidies for fossil fuels amounted to **\$260 BILLION** — compared to \$140 billion for renewables.



**FOSSIL FUEL SUBSIDIES ARE KEY DRIVERS OF GREENHOUSE GAS EMISSIONS.** In 2014, approximately
13% of global CO<sub>2</sub> emissions were linked to the use of subsidized fossil fuels.

#### **Energy Subsidy Reform Technical Assistance Facility:**

ESMAP's Energy Subsidy Reform Technical Assistance Facility is a \$20 million initiative that supports governments in their reform process. In FY2017, the facility allocated more than **\$3 million** for country-specific technical assistance activities in **7 countries**: Belarus, Brazil, India, Kyrgyz Republic, Myanmar, Nepal, and Ukraine. It also completed **regional activities** in Central America (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama) and the Southeast Europe and Western Balkans (Albania, Bosnia and Herzegovina, Kosovo, FYR Macedonia, Montenegro, and Serbia). Work on **China**, **Egypt**, **Iraq** (incl. Kurdistan Regional Government), and **Uzbekistan** is currently focusing on assessing poverty, economic and social impact of reform, and public awareness campaigns, among others.

Since 2013, the facility has allocated **\$13 MILLION** for technical assistance to **24 COUNTRIES**, through **41 ACTIVITIES**. This work has informed **\$4.5 BILLION** in World Bank lending projects with subsidy reform components.

#### Long-term, Comprehensive Support Ensures Sustainable Reforms

#### **EGYPT:**

ESMAP technical assistance had previously helped Egypt slash energy subsidies. Building on this success, an analysis of the economic impacts of reform and support for citizen engagement and communications enhanced the sustainability of subsequent tariff increases. The reduction in subsidies allowed for increased budgetary spending on health, education, and social protection. It also improved the credit-worthiness of the utilities, which has helped to attract private capital to the sector, as illustrated by a large private financing package prepared by the IFC for 13 solar plants.

#### **UKRAINE:**

ESMAP's support in FY2017 built on the successes of previous engagements that helped the government increase tariffs, improve the financial viability of the gas sector, and increase the number of households covered by the social protection system. To sustain these reforms, ESMAP drew on the World Bank's expertise across several sectors to develop a communication strategy, analyze the impacts of reform, and share knowledge on the design and management of social assistance programs. This work directly supported a \$500 million World Bank development policy loan (DPL) to boost Ukraine's reforms in governance, business environment, energy, and social assistance.

#### **IRAQ:**

Building on previous work, ESMAP analyses of the cost of power services and the economic impact of subsidy removal (oil, gas, and electricity) informed the design of electricity subsidy reduction components in two consecutive World Bank DPLs totaling \$2.6 billion. Subsequently, in 2016, the government announced an increase in electricity tariffs from an average of \$0.017 per kWh to \$0.0811 per kWh. The current support is expected to result in a road map for full cost recovery and improved service delivery.

#### **WESTERN BALKANS:**

ESMAP analysis is guiding the Bank's policy dialogue, technical assistance, and financing in the energy sectors of Albania, Bosnia and Herzegovina, Kosovo, FYR Macedonia, Montenegro, and Serbia. A key output was a financial analysis of the power sector in each country, which found that below-cost recovery tariffs account for approximately 70% of identified financial gaps. As a result, designing new tariff systems is now a core aspect of the dialogue. In **Serbia**, an analysis of energy price affordability and ways to protect vulnerable populations from tariff increases has informed the design of two DPLs on public expenditures and utilities. A subsequent program will include further actions to improve the financial sustainability of the state-owned utilities by raising cost recovery levels and widening the coverage of the social protection measures.

#### **Knowledge and Partnerships**

Several knowledge exchange activities took place in FY2017 to encourage global learning and deepen dialogue among practitioners. The Energy Subsidy Reform Online Community (ESROC), whose membership reached 255 policy makers and practitioners as of June 2017, hosted two webinars: one on mitigating the impact of subsidy reform and one on fuel and electricity price indexation in Morocco. An online **Community of Practice** was also launched to provide a space for dialogue and knowledge sharing among World Bank teams working on subsidy reform.

ESMAP continued to nurture its partnership with key players in energy subsidy reform to ensure that the issue remains at the top of policy agendas. Together with the World Bank's Nordic Executive Directors' Office and the Friends of Fossil Fuel Subsidy Reform, ESMAP organized a panel discussion during the World Bank Spring Meetings in April 2017 on "Energy Subsidy Reform: Country Experiences and Progress Made." This ministerial-level event discussed the experience of Armenia, Mexico, the Philippines, and New Zealand in implementing reforms.



# CHAPTER 7 SUSTAINABLE ENERGY FOR ALL (SEFORALL) KNOWLEDGE HUB

#### **Tools to Influence Policies, Mobilize Investments**

According to the Regulatory Indicators for Sustainable Energy (RISE) 2017, reaching the SEforALL goals will require almost tripling the historical annual investment flows to about \$1 trillion. Countries will need to embrace an enabling environment that attracts all forms of investment — public and private. ESMAP launched three comprehensive data and analytical tools to help governments craft policies that attract investments and track progress toward SDG7.

#### Regulatory Indicators for Sustainable Energy (RISE)

An increasing number of developing countries are emerging as leaders in support to sustainable energy, with robust policies to support energy access, renewables and energy efficiency. While important policy gaps remain across all regions there is significant opportunity for rapid progress - RISE Report, launched at the World Bank's Headquarters in Washington DC, February 15, 2017.

## RISE: ESTIMATED AUDIENCE REACHED GLOBALLY:

68 MILLION PEOPLE

- 3 million Twitter accounts reached through the World Bank's #endpoverty campaign, making RISE trending on Twitter
- 100,000 Facebook users accessed the video broadcast of the launch event
- Strong media coverage from Reuters, AFP, the Guardian and others

WHAT IS IT: RISE is the first global policy scorecard of its kind, assessing the regulatory indicators of 111 countries in three areas: energy access, energy efficiency and renewable energy. The report aims to help governments assess if they have a policy and regulatory framework in place to drive progress on sustainable energy, and pinpoints the areas where more can be done to attract private investments. RISE also enables countries to measure their performance against others, and will allow them to track progress over time.

WHO CAN ACCESS RISE: RISE has launched a free, online data platform in FY2017 to enable global audiences to customize the indicators by country or theme, based on their needs. RISE has formed the basis for World Bank policy engagements in some client countries. Other multilateral development banks, country governments, experts, and practitioners also use the data in their decision making and planning.



### A Global Tracking Framework (GTF) to Measure Progress on SDG7

The current pace of progress on SDG7 is not moving fast enough to meet targets by 2030 — GTF 2017 launched at the Sustainable Energy Forum in New York on April 4, 2017

**WHAT IS IT:** The GTF is a global dashboard to track country progress on energy access, energy efficiency, and renewable energy against the SDG7 targets. This third edition of the GTF builds on the solid foundation of years of data collection on electrification and clean cooking.

### WHO CAN ACCESS THE DATA:

GTF's interactive website, launched in FY2017, allows users globally to download free data and country reports, as well as to create customized graphics, including maps, time lines, and cross-country comparisons.



This year's Global Tracking Framework is a wake-up call for greater effort on a number of fronts. There needs to be increased financing, bolder policy commitments, and a willingness to embrace new technologies on a wider scale. The World Bank is committed, along side our international development partners, to support countries to reach these goals.

 Riccardo Puliti | Senior Director and Head of Energy and Extractives at the World Bank.



From April to June 2017, **GTF** online platform had more than **4,000 users** and more than **16,000 page views**.

### State of Electricity Access Report (SEAR)



The world is not moving fast enough to reach its universal electricity access goal by 2030. A substantial acceleration of efforts and investments are needed to achieve this objective.

 The State of Electricity Access Report (SEAR) 2017, launched at the Vienna Energy Forum

**WHAT IS IT:** SEAR is a comprehensive report that examines the critical role of energy in achieving the SDGs, providing a snapshot of the status of electricity access, based on the Global Tracking Framework. The report found that significant acceleration of efforts is needed to reach universal access to energy and that both grid and off-grid approaches are critical given that they are supported by a conducive environment.

### Beyond Connections: Energy Access Redefined through a Multi-Tier Framework

WHAT IS IT: The Multi-Tier Framework (MTF) goes beyond the traditional approach to measuring access to energy — either having access or not — to capture multiple dimensions of access such as capacity, duration, quality and reliability, affordability, and safety, as well as the impact on socioeconomic development. This approach provides more insightful information to enable policy-makers to choose the most appropriate interventions.

WHERE IT IS IMPLEMENTED: The MTF global surveys are currently under implementation in 17 countries to establish a baseline for universal access to electricity and clean cooking. MTF energy data collection has been completed in seven countries (Cambodia, Ethiopia, Honduras, Kenya, Liberia, Myanmar, and Rwanda,) and is under implementation in 10 countries (Bangladesh, DRC, Haiti, India, Nepal, Niger, Nigeria, São Tomé and Príncipe, Uganda, and Zambia). During the Vienna Energy Forum, emerging findings from Kenya and Rwanda, were shared with key stakeholders.

### Outreach in every corner of the world:



### **NEW YORK:**

United States of America

GTF was launched during the keynote at the Sustainable Energy Forum on April 4, 2017, reaching a wide audience.



### **ASTANA:**

Kazakhstan

RISE and GTF were featured at the Sustainable Energy Ministerial on June 12-13, 2017, where the GTF Regional Companion Reports authored by each of the five UN Regional Economic Commissions were launched.



The Philippines

RISE and GTF findings pertaining to Asia formed the basis of the keynote presentation at the Asia Clean Energy Forum in Manila before an audience of 1,500 practitioners.





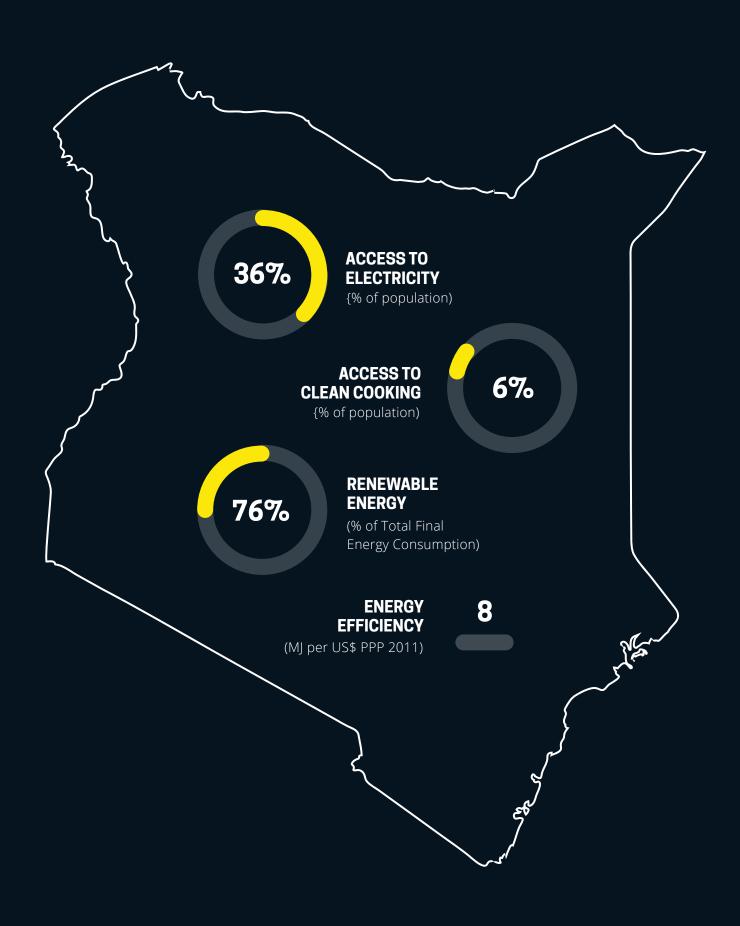
### VIENNA:

Austria

All four products came together during the Vienna Energy Forum. SEAR was formally launched during one of the Vienna Energy Forum's main events on energy access. Insights from RISE and GTF were also highlighted during sessions and the MTF presented preliminary findings from Rwanda and Kenya.

### Connecting the Expertise of More than 20 Partners:

Partnerships lie at the heart of ESMAP's support to the SEforALL Knowledge Hub. The work of the Knowledge Hub would not have been possible without the collaboration of several international organizations, nongovernmental organizations, and bilateral and multilateral agencies.



## SEFORALL KNOWLEDGE HUB COMES INTO FULL PLAY IN KENYA

### **SEAR: INCREASING ACCESS TO CLEAN COOKSTOVES**

An Impact Evaluation Study found that only 52% of the population in the target areas had access to an improved stove. It also found that a direct subsidy or payment installment plan would help reduce households' financial burden and boost stove adoption.

### **GTF:** MONITORING PROGRESS AGAINST SDG7

2012-14 data showed that Kenya still had a long way to go to electrify its population even though it is one of the leaders in renewable energy. The data has strengthened the dialogue on access to electricity and clean cooking.

### RISE: UNDERSTANDING THE ENABLING ENVIRONMENT FOR ENERGY INVESTMENT

RISE found that Kenya made great strides in grid densification and extension and concluded that the country built a strong enabling environment for increasing energy access. To help Kenya scale up grid extension and mini grids, the World Bank has supported the development of mini grid regulations, and plans to implement an innovative public-private-partnership mini grid framework, as a part of an upcoming World Bank project.

### MTF: TARGETING INTERVENTIONS TO REACH THE REMOTE COMMUNITIES

MTF data from 14 underserved counties in the northern part of the country provided critical information on energy access, socio-economic characteristics, affordability and consumption. These counties will be covered by an upcoming World Bank investment project.

### **CHAPTER 8**

# SMALL ISLAND DEVELOPING STATES

ESMAP has been focusing on Small Island Developing States (SIDS) because of their unique sustainability challenges. SIDS often rely heavily on imported fossil fuels for most their energy needs, especially for transport and electricity generation. Transitioning from fossil fuels to renewable energy will help SIDS secure their energy and create economic opportunity.

Many SIDS have taken steps towards energy independence through new partnerships, new investment, and innovative technologies, and have enacted energy plans with bold targets. In FY2017, ESMAP drove the continued development of renewable energy sources in SIDS with an active portfolio of \$12.5 million. The most impressive results stemmed from geothermal development activities.

### **SIDS BY THE NUMBERS (FY2017):**

SIDS DOCK is a

**22** 

**MILLION** US\$ initiative funded by Denmark and Japan

6

COUNTRY-SPECIFIC ACTIVITIES in Cabo Verde, Dominica, Saint Lucia, Tuvalu, São Tomé and Principe, and Vanuatu

3

### **REGIONAL ACTIVITIES**

in the Pacific (Pacific Power Association), Caribbean (C-SERMS), and Eastern Caribbean (OECS) (link to M&E database) 99

MILLION US\$ leveraged in 3 World Bank projects, of which \$67 million directly supports geothermal development

Still in the earliest stages of geothermal development, **Saint Lucia** benefited from ESMAP support that helped to identify an operable geothermal reservoir on the island. Technical assistance focused on surface studies, and provided an environmental and social impact assessment, among other related activities. The findings of this surface exploration effectively laid the groundwork for the next phase,

and arguably the riskiest and most expensive phase, of geothermal resource development to be financed by the World Bank. The \$22 million Saint Lucia Renewable Energy Sector Development Project will test the viability of the resource through exploratory drilling. This geothermal field could have the potential to sustain a 30MW geothermal power plant to set Saint Lucia on a low carbon path to economic prosperity.

### STAGES OF GEOTHERMAL PROJECT DEVELOPMENT

### EARLY STAGE

- Preliminary Survey
- Surface Exploration
- Exploration Drilling

### MIDDLE STAGE

Project Review & Planning

### LATE STAGE

- Construction
- Commissioning
- Operation & Maintenance

In **Dominica** ESMAP's ongoing technical assistance helped the country through the middle stages of geothermal development by providing guidance on geothermal drilling, good industry practice, and procurement. The resultant \$45 million Geothermal Risk Mitigation Project will advance the country through drilling and construction of a geothermal power plant, which will help diversify its power generation mix. The project will also explore the possibility of exporting geothermal-based electricity to other island nations. Success in Dominica offers an opportunity to widen access to sustainable energy and reduce the crippling costs of power in the region.

In São Tomé and Príncipe, ESMAP worked with the country's state-owned utility, Empresa de Agua e Electricidade (EMAE) to improve its capacity to distribute power and strengthen the quality of service to expand reliable access

to the population. In close collaboration with EMAE, ESMAP identified the deficiencies of the technical design, construction, maintenance, and operation of the island's power plants. This support informed a \$16 million World Bank infrastructure project to finance implementation of ESMAP's recommendations. The STP Power Sector Recovery Project aims to increase renewable energy generation and improve the reliability of the electricity supply across the island. It focuses on scaling up hydropower generation through the rehabilitation of El Contador power plant and reducing distribution losses through an operation and maintenance support program.

In the wake of the devastating effects of Cyclone Pam in 2015, ESMAP helped **Vanuatu** to improve its energy sector planning and policy, legal, and regulatory frameworks. By working with the Department of Energy and the Utilities Regulatory Authority to review and draft priority legislation and regulations and update the National Energy Road Map with energy efficiency reforms; as well as conduct a small hydropower resource mapping exercise and provide a prefeasibility study on renewable energy mini grids, ESMAP is helping to meet the country's ambitious renewable energy targets.

On the regional level, the program launched the Caribbean Sustainable Energy Strategy and Roadmap (C-SERMS) Platform — a regional energy coordination initiative, managed by CARICOM, to better align national and regional priorities with renewable energy and energy efficient investment opportunities to achieve sustainable energy goals.



## FINANCIAL REVIEW

This chapter outlines the FY2017 financial information for the three multi-donor trust funds (MDTFs) that are under ESMAP's management and administration, namely, ESMAP, ASTAE, and SIDS DOCK.

### **Contributions**

In FY2017, ESMAP received a total of \$40.4 million from 11 donors, including the World Bank, a 30% increase from FY2016. ASTAE and SIDS DOCK did not receive any contributions in FY2017. Table 9.1 shows actual receipts in FY2017 from individual donors for the three MDTFs, as well as cumulative receipts since FY2010 when the ESMAP Multi-Donor Trust Fund was established. In FY2017, Luxembourg and The Rockefeller Foundation joined as new ESMAP donors. ESMAP has mobilized \$140 million for its FY17-20 Business Plan, compared to the target of \$215 million.

**TABLE 9.1:** Overview of Donor Contributions to ESMAP, ASTAE, and SIDS DOCK MDTFs, FY2010-17 (\$, thousands)

	FY2017	Paid-in Contr	ibution	Cumulati	FY2010-17			
Country	ESMAP	ASTAE	SIDS	ESMAP	ASTAE	SIDS	TOTAL	
Australia				8,729.14			8,729.14	3.5%
Austria				6,144.96			6,144.96	2.4%
Denmark*	9,910.26			41,872.03		7,093.12	48,965.15	19.4%
Finland	145.10			1,672.64			1,672.64	0.7%
France				1,967.14			1,967.14	0.8%
Germany	7,745.75			15,616.95			15,616.95	6.2%
Iceland	1,433.43			3,539.56			3,539.56	1.4%
Italy								
Japan						9,000.00	9,000.00	3.6%
Lithuania				97.79			97.79	
Luxembourg	1,121.60			1,121.60				
Netherlands	10,869.57			48,768.79	12,000.00		60,768.79	24.1%
Norway	3,510.76			19,394.95			19,394.95	7.7%
Rockefeller Foundation	250.00			250.00				
Sweden	3,454.71			12,081.91	5,913.75		17,995.66	7.1%
Switzerland				4,000.00			4,000.00	1.6%
United Kingdom	1,539.75			44,718.78	6,324.75		51,043.53	20.3%
World Bank	400.00			3,076.84			3,076.84	1.2%
Grand Total	40,380.93			213,053.08	24,238.50	16,093.12	252,013.10	

<sup>\*</sup> Denmark's contribution in FY2016 included US\$3.26 million provided by the European Commission.

### **Disbursements**

ESMAP disbursed almost \$36 million in FY2017, about the same as the previous year, or about 103% of the FY2017 budget plan of \$35 million. Disbursement for SIDS DOCK totaled \$1.6 million, a decrease of about 21% from the prior fiscal year. ASTAE disbursement was approximately \$5.5 million for FY2017, maintaining the same level as prior year disbursements. Table 9.2 presents disbursements for the three MDTFs for FY2015–17. Costs are separated into: (i) project disbursements by region and for global programs and (ii) disbursements for program management, administration, communications, and knowledge management.

Regional activities accounted for more than 75% of disbursements, with country engagements in Africa constituting about one-third of total disbursements and more than 40% of regional project costs. It should also be noted that Global Program includes technical support by the central ESMAP unit to country/regional activities.

Although there was a decrease in disbursement for SIDS DOCK, over 75% of the remaining balance of the SIDS DOCK MDTF has been committed to consultant contracts. Overall, costs for ESMAP program management, communications and knowledge management decreased in FY2017 by about 36%. Similarly, program management costs for SIDS DOCK and ASTAE decreased by 41% and 62%, respectively, as economies of scales are realized in management of the three MDTFs.

**TABLE 9.2:** ESMAP, ASTAE, and SIDS DOCK Disbursements, FY2015-17 (US\$ thousands)

		FY15			FY16			FY17				
	ESMAP	ASTAE	SIDS		ESMAP	ASTAE	SIDS		ESMAP	ASTAE	SIDS	
Project Cost	\$25,082.21	\$4,858.66	\$1,040.88	94%	\$33,974.83	\$5,471.33	\$1,968.60	95%	\$34,510.85	\$5,482.61	\$ 1,559.00	97%
Africa	8,972.78		539.23		11,973.99		52.18		10,970.67		263.99	
East Asia	2,680.42	3,801.59	36.39		3,052.50	3,289.12	419.04		3,787.35	3,201.84	481.56	
Europe & Central Asia	2,224.79				3,265.22				3,024.96			
Latin America & Caribbean	2,110.19		465.26		2,231.31		1,497.37		2,675.92		813.46	
Middle East & North Africa	413.85				2,100.21				3,128.17			
South Asia	2,834.55	1,014.09			2,191.04	2,182.22			2,348.51	2,280.76		
Global Program	5,845.62	42.98			9,160.56				8,575.28			
Program Management, Comm & KM	\$1,708.45	\$58.18	\$165.30	6%	\$1,991.33	\$104.05	\$66.68	5%	\$1,280.84	\$39.92	\$39.67	3%
Program Management	736.29	58.18	89.57		829.12	87.30	55.63		591.41	39.92	39.67	
Governance (CG, TAG)	85.37				58.17				129.11			
Trust Fund Administration	151.51				12.86				60.22			
Portfolio Management (Monitoring & Evaluation)	189.51				641.44	16.76			27.21			
Knowledge Management	97.95		75.72				11.05		6.75			
Communication and Outreach (publications, website , & other dissemination)	447.81				449.75				466.14			
Total	\$26,790.65	\$4,916.84	\$1,206.18		\$35,966.15	\$5,575.39	\$2,035.28		\$35,791.69	\$5,522.53	\$1,598.67	
Of which:												
Funded by Donors	26,572.43	4,916.84	1,206.18		35,516.15	5,575.39	2,035.28		35,391.69	5,522.53	1,598.67	
Funded from World Bank budget	218.22				450.00				400.00			

### Breakdown, by Region and Thematic/Cross-Cutting Areas

Table 9.3 presents disbursements by region and ESMAP's Thematic and Cross-Cutting areas. Annual Block Grants (ABGs) comprised the largest portion of ESMAP's portfolio, followed by Renewable Energy Resource Mapping, at 26% and 13%, respectively, of total disbursements for ESMAP in FY2017. Within the ABG portfolio, disbursements in the Africa Region was 47% of the total ABG disbursements and 12% of the total ESMAP disbursements in FY2017.

**TABLES 9.3:** ESMAP, ASTAE, and SIDS DOCK Disbursements, by Program Area, FY2017 (US\$ thousand)

	CROSS-CUTTING SOLUTIONS			ENERGY ACCESS			RENEWABLE ENERGY			ENERGY EFFICIENCY					
	Annual Block Grants	Energy Subsidy Reform	SEforALL Knowledge Hub	ECCH	SEforALL TA	Mini- grids	Urban Poor	Global Lighting	GGDP	RE Mapping	VRE	Solar TA	EE Buildings	EE City Services	Other Programs
Africa	4,399.9	217.4		55.3	1,344.7	484.0	109.3	838.9	350.3	2,251.8	254.7	145.1	50.1	143.2	326.0
East Asia	1,252.2	278.3		256.7	98.4				234.7	1,041.7	97.8	70.5	26.1	428.2	2.6
Europe & Central Asia	979.4	1,134.6		229.6			43.1		89.1		31.1	21.6	83.8	412.5	
Latin America & Caribbean	619.4	238.7		81.3	82.6			1.3	348.7		458.8	48.4	69.0	722.6	5.0
Middle East & North Africa	1,453.9	1,558.1												116.1	
South Asia	587.6	47.4			299.9					802.9	384.9		23.8	202.0	
Global Program	98.6	803.6	2,744.9	510.1		1,391.7	278.3	0.8	404.2	515.5	155.2	79.1	821.6	574.2	197.5
Program Management, KM & Communications															1,280.8
Total	9,391.0	4,278.2	2,744.9	1,133.1	1,825.6	1,875.7	430.7	840.9	1,427.1	4,611.9 1	,382.6	364.9	1,074.4	2,598.8	1,812.0

#### TOTAL DISBURSEMENT

	ESMAP	ASTAE	SIDS	Total
Africa	10,970.7		264.0	10,970.7
East Asia	3,787.4	3,201.8	481.6	7,470.8
Europe & Central Asia	3,025.0			3,025.0
Latin America & Caribbean	2,675.9		813.5	3,489.4
Middle East & North Africa	3,128.2			3,128.2
South Asia	2,348.5	2,280.8		4,629.3
Global Program	8,575.3			8,575.3
Program Management, KM & Communications	1,280.8	39.9		1,360.4
Total	35,791.7	5,522.5	1,598.7	42,912.9

Note: Other Programs include programs implemented by ESMAP unit and other departments that are not part of World Bank Regions (e.g. Gender, Climate, etc.).

### **ABOUT ESMAP**

ESMAP is a multi-donor trust fund administered by the World Bank Group (WBG), anchored in the Energy & Extractives Global Practice in Washington, DC. As a long-standing partnership between the WBG and bilateral partners, ESMAP helps low- and middle-income countries reduce poverty and boost growth through environmentally sustainable energy solutions. ESMAP's analytical and advisory services are fully integrated within the WBG's country policy dialogue and lending programs in the energy sector.

ESMAP's program includes both regional and country-focused activities implemented primarily by regional energy teams at the World Bank and global initiatives managed by the ESMAP program unit. The ESMAP core unit of about 30 staff is responsible for the day-to-day management of the program and implementation of ESMAP's Business Plan. The unit comprises teams working on several areas such as energy access, renewable ener-

gy, energy efficiency, energy subsidy reform, gender, communications, and monitoring and evaluation. The unit is also responsible for the management and administration of the SIDS DOCK Multi Donor Trust Fund (MDTF).

ESMAP is governed by a Consultative Group (CG) comprising representatives from contributing donors and chaired by the Senior Director of the World Bank's Energy and Extractives Global Practice. The CG meets annually to review the strategic direction of ESMAP, its achievements, use of resources, and funding requirements. A Technical Advisory Group (TAG) consisting of three 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 advice and suggestions to the CG on current and emerging global energy sector issues likely to impact ESMAP's client countries.

### **OUR DONORS**

**Australia** | Department of Foreign Affairs and Trade

**Austria |** Federal Ministry of Finance

**Denmark |** Royal Ministry of Foreign Affairs

**European Commission** 

**Finland |** Ministry for Foreign Affairs

**France** | Agence Française de Développement **Germany** | Federal Ministry for Economic

Cooperation and Development; Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

**Iceland |** Ministry of Foreign Affairs **Italy |** Ministry of Foreign Affairs and

International Cooperation

Japan | Ministry of Finance

**Lithuania** | Ministry of Foreign Affairs; Ministry of the Environment

**Luxembourg** | Ministry for Sustainable Development and Infrustructure

**The Netherlands |** Ministry of Foreign Trade and Development Cooperation

**Norway |** Ministry of Foreign Affairs Rockefeller Foundation

**Sweden |** Swedish International

Development Cooperation Agency

**Switzerland** | Swiss State Secretariat for Economic Affairs

**United Kingdom** | Department for International Development

The World Bank Group

