ENERGY SECTOR MANAGEMENT ASSISTANCE PROGRAM

ANNUAL REPORT 2018

ESMAP

SUPPORTED BY WORLD BANK GROUP

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CHAPTER 1

AT THE FOREFRONT OF PROGRESS ON SUSTAINABLE ENERGY

***Tracking Sustainable Development Goal 7 (SDG7): The Energy Progress Report*, released by ESMAP in May 2018 as a collaboration between the International Energy Agency (IEA), the International Renewable Energy Agency (IRENA), United Nations Statistics Division (UNSD), the World Bank, and the World Health Organization (WHO), shows that the world is not currently on track to meet SDG7 — ensuring access to affordable, reliable, sustainable, and modern energy for all by 2030. Nevertheless, real gains are being made in certain areas. Expansion of access to electricity in poorer countries has recently begun to accelerate, with progress overtaking population growth for the first time in Sub-Saharan Africa.**

The report also found that **renewable energy** is making impressive gains in the electricity sector thanks to declining costs, although these gains are not being matched in transportation and heating — which together account for 80% of global energy consumption. Since 2010, **global energy intensity** has been falling at an accelerating pace of 2.2%. Energy intensity in industry — the largest energy consuming sector — has been improving at the rate of 2.7% per year.

The area lagging the furthest behind of all four energy targets in SDG7 is **clean cooking**. If the current trajectory continues, 2.3 billion people will continue to use traditional cooking methods in 2030 leading to significant health, economic, and environmental impacts.

More encouraging than global trends, however, are the strong performances of specific countries. These national experiences provide valuable lessons for others and evidence is mounting that with holistic approaches, targeted policies, and international support, substantial gains can be made in clean energy and energy access.

ESMAP: At the Center of Global Efforts to Reach SDG7 and Climate Targets

The World Bank's Energy Sector Management Assistance Program (ESMAP) has been spearheading key developments in the energy sector in low- and middle-income countries. ESMAP's programs are geared toward the achievement of SDG7 and the Paris Agreement to keep global temperatures from rising below 2ºC, particularly through:

Leading a major **Energy Access** effort by the World Bank focused on closing financing gaps and accelerating electrification rates through comprehensive grid and off-grid strategies, including some of the largest electrification investment programs, such as in Ethiopia, Kenya, Myanmar, and Nigeria.

- ESMAP's technical assistance, policy advice, and project development support have driven an increase in World Bank financing for mini grid and off-grid solutions, from an average of less than US$200 million per year between FY2014–17 to US$600 million in FY2018. The World Bank is now financing about 25% of investments in mini grids globally. Lighting Africa has now reached 165 million people with 33 million quality-certified off-grid solar products.
- ESMAP's work in Efficient, Clean Cooking and Heating (ECCH) is supporting much of the World Bank's US$300+ million ECCH portfolio and is continuously pushing the envelope through the design and implementation of innovative, results-based financing and consumer incentives.

Playing a major role in helping the World Bank achieve its **Climate Change Action Plan** (CCAP) targets. The World Bank has supported 13.6 GW renewable energy generation and integrated 3.9 GW renewable energy into grids over CY16–17. ESMAP played a key role in achieving this target by helping to develop 25 investment projects, including Grid Connected Solar Rooftops in India, the Turkey Geothermal Development Project, and the Scaling Solar Project in Zambia. ESMAP is also:

- Leading the development of the World Bank Group's US$5 billion initiative to scale up the deployment of **battery energy storage** for variable renewable energy integration. ESMAP is also supporting the **International Solar Alliance** (ISA).
- Mobilizing financing from the **Green Climate Fund** (GCF). In FY2018, ESMAP supported the development of three projects, that were approved by the GCF Board, for a total of US$301.3 million. Together with World Bank financing, the GCF's concessional funds will help develop innovative financing mechanisms to unlock the potential of energy efficiency in Brazil and Vietnam, and scale up a market-based approach for clean cooking solutions in Bangladesh.
- De-risking **geothermal investments**. ESMAP's Global Geothermal Development Plan (GGDP) has laid the ground for six World Bank projects totaling US$710 million in **Armenia**, **Chile**, **Djibouti**, **Ethiopia**, **Indonesia**, and **Turkey** with another four projects in the pipeline to reduce geothermal resource risks, thereby addressing a fundamental market barrier that prevents commercial investment in the sector.
- Increasing investments in **energy efficiency**. ESMAP is spearheading a major cross-sectoral effort within the World Bank to mainstream energy efficiency in urban services and buildings, transport, and water, and to mobilize investments through innovative financing and delivery models, and stronger standards and policies. Successful examples include Brazil, India, and Mexico. In CY2016–2017, the World Bank delivered US$4.9 billion toward its CCAP targets for energy efficiency and resilient buildings investments, with many of the projects being developed with ESMAP support. ESMAP is working with IFC to deploy its Excellence in Design for Greater Efficiencies (EDGE) program in World Bank operations.

- Playing a leadership role in **energy subsidy reform**. ESMAP has taken the lead in developing a multi-sectoral approach to assessing energy subsidies and designing reform measures. It has brought together the World Bank's expertise in social protection, macro-economic and fiscal management, poverty and social impact analyses, energy and environmental policy, finance, competitiveness, and investment to develop the Energy Subsidy Reform Assessment Framework (ESRAF). ESRAF provides a guide to analyzing energy subsidies, the impacts of subsidies and their reforms, and the political economy context for reform. In FY2018, ESMAP support in this area underpinned US$2.54 billion in World Bank development policy financing.

ESMAP's Convening Role in the Global Energy Community

During FY2018, ESMAP played a vital role in bringing together development partners, clients, industry, and other stakeholders for knowledge exchange, building consensus on sustainable energy strategies based on lessons learned, and developing collaboration in the sector. These include:

- The **Action Learning Event on Mini Grids in Abuja**, **Nigeria**, which attracted 600 participants including private sector developers, regulators, state governments, communities, distribution companies, and development partners, building on the momentum gained from previous years' learning events in Kenya, Myanmar, and Tanzania.
- The **Global Off-Grid Forum and Expo in Hong Kong**, attended by nearly 700 participants from 65 countries, including industry experts, donors, private sector representatives, and country governments.
- The **Knowledge Exchange Forum in London**, hosted by the UK Department for International Development (DFID) and the UK Department for Business, Energy and Industrial Strategy (BEIS), brought together over 130 participants from many World Bank client countries and partners to discuss how to strengthen energy systems in a time of technology disruption.
- A session in the **Iceland Geothermal Conference** organized jointly with the Icelandic Ministry of Foreign Affairs to commemorate the fifth anniversary of the Global Geothermal Development Plan (GGDP) showcased how the GGDP has helped unlock investment in geothermal development and provided a platform for countries to share their experiences, highlighting different approaches.

ESMAP is organizing several events in FY2019. These include another Knowledge Exchange Forum in Geneva on Energy Subsidy Reform that will be jointly organized with Switzerland's State Secretariat for Economic Affairs (SECO), a solar learning event in Morocco, and several consultations to establish a global consultative group on energy storage.

HOW ESMAP IS HELPING TO MAXIMIZE FINANCE FOR DEVELOPMENT

ESMAP aims to mobilize significant private sector investments by strengthening policy environments, mitigating risks, and building capacity, following the principles under Maximizing Finance for Development (MFD).

- ESMAP activities in Bangladesh, India, Myanmar, and Uzbekistan have supported **dispatch efficiency analysis** that aims at establishing a transparent and least-cost dispatch protocol. This helps to ensure that newer and more efficient gas plants that in several cases are owned by private companies are dispatched before inefficient plants. ESMAP's work in India on ancillary services market design, which informed the Central Electricity Regulatory Commission's white paper on the subject, will pave the way for independent power producers to be paid for grid frequency control services.

- ESMAP-supported power systems planning activities — **especially least-cost generation planning studies** for several countries/regions including Lao PDR, Pakistan, Tanzania, Vietnam, Central Asia, and the West African Power Pool — provide a sound economic basis for the private sector to identify investment opportunities especially in clean energy and to prioritize projects. For instance, ESMAP's study in West Africa identified significant opportunities for investment in solar photovoltaic (PV) in Burkina Faso and Mali.

- ESMAP supported the development of the **Nigeria** Electrification Project, which aims to leverage US$410 million in private sector investments in solar mini grids and stand-alone solar systems to provide electricity to 2.5 million people and 70,000 businesses. The electrification program was based on geospatial electrification tools that provided free data on viable mini grid sites to help private sector developers to enter the market.

- **Lighting Global**, a joint World Bank/ESMAP-IFC program to develop off-grid solar markets, helps governments to strengthen the enabling environment for the private sector to provide off-grid energy services to households, businesses, and public establishments. For example, in **Kenya**,Lighting Global helped design a loan facility for importers and retailers of solar systems to provide incentives for them to enter the most remote, underserved markets. In **Nigeria**, it supported the design of the results-based grant facility to expand off-grid electrification.

- ESMAP's **Global Geothermal Development Plan** (GGDP) is scaling up private investment in geothermal development by mobilizing concessional financing to mitigate some of the upstream resource risk. For example, the Geothermal Development Project in **Turkey** aims to increase private investment by providing partial coverage of the financial risk involved in exploration drilling and credit lines to finance capacity drilling and power plant construction.

- The **Global Solar Atlas** and **Global Wind Atlas** are used by private sector developers and other stakeholders. The data are particularly helpful to new entrants and smaller developers at preliminary stages of project development. In **Ethiopia**, the ESMAP-funded wind measurement and pre-feasibility study is helping the government to prepare a series of projects for potential private sector investment, in partnership with IFC.

- ESMAP supports the design of **revolving financing mechanisms**, which demonstrate the financial viability of **energy efficiency investments** as a basis for mobilizing future private sector funds and help develop the local private sector and energy service companies (ESCO) market. For example, in Montenegro, ESMAP helped design an innovative financing model that formed the basis of the World Bank **Montenegro** Second Energy Efficiency Project to fund energy efficiency (EE) retrofits in hospitals and clinics.

- ESMAP is supporting the development of public-private approaches and mechanisms to unlock private sector capital for investments in EE infrastructure. In **Brazil**, ESMAP initially helped identify viable business models for urban EE sectors, which were funded under the Financial Instruments for Brazil Energy Efficient Cities (FinBRAZEEC) project. The project will help attract private investment at scale in efficient street lighting and industrial EE for a total of US$1.3 billion. ESMAP was also instrumental in designing FinBRAZEEC components that secured US$195 million from GCF.

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ESMAP'S GLOBAL KNOWLEDGE PRODUCTS

Providing policy makers, multilateral and bilateral development agencies, private investors, practitioners, and academia with crucial energy knowledge and data.

Global Reports and Data Platforms Launched in FY2018

- Tracking SDG7: The Energy Progress Report 2018
- Energy Subsidy Reform Assessment Framework (ESRAF)
- Off-Grid Solar Market Trends Report 2018
- Global Wind Atlas
- Multi-Tier Framework (MTF) Country Diagnostic Reports: **Cambodia, Ethiopia, Rwanda**

Forthcoming in 2019

- Tracking SDG7: The Energy Progress Report 2019
- Policy Matters: Regulatory Indicators for Sustainable Energy (RISE)
- Multi-Tier Framework (MTF) Country Diagnostic Reports: **Bangladesh, Honduras, Myanmar, Nepal, Zambia**
- State of Mini Grid Sector Report
- Where Sun Meets Water: Floating Solar Market Report
- State of Clean Cooking Report
- Rethinking Power Sector Reform
- Mobilizing Commercial Finance for Grid-Connected Solar Projects
- Electric Mobility and Development

A Strong Portfolio

Fiscal year (FY) 2018 was the second year of implementation of ESMAP's four-year Business Plan (FY2017–20). ESMAP made considerable progress toward achieving the targets and results within the first half of its Business Plan, as outlined in the Results Framework. Programs such as Global Facility on Mini Grids, Lighting Global, the Urban Poor Electricity Access Program, and the Energy Subsidy Reform Facility achieved or exceeded their targets for the entire four-year period of the Business Plan. All other ESMAP programs also made considerable progress, in many cases reaching over half of their respective targets. Concrete program results are illustrated throughout the report and demonstrate how ESMAP activities inform World Bank development financing and help shape energy policies.

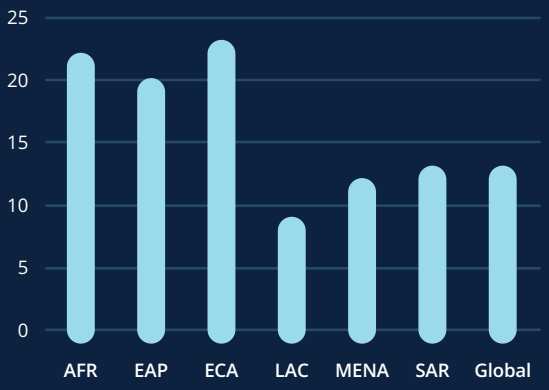
FY2018 BY THE NUMBERS

258 activities are supported by ESMAP's active **US$139.4 million** portfolio

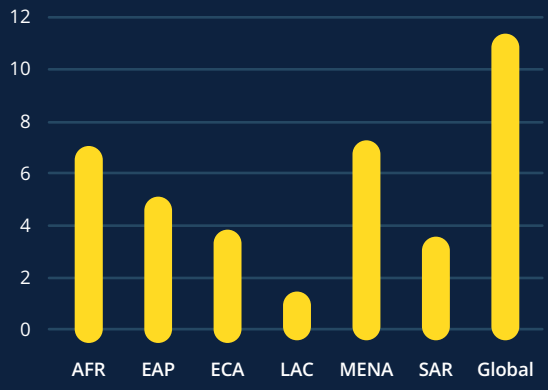
US$32 million was allocated for **new activities:**

- 113 activities in 53 countries (excluding regional activities)
- 15 activities with a global focus, most of which support country engagements across regions

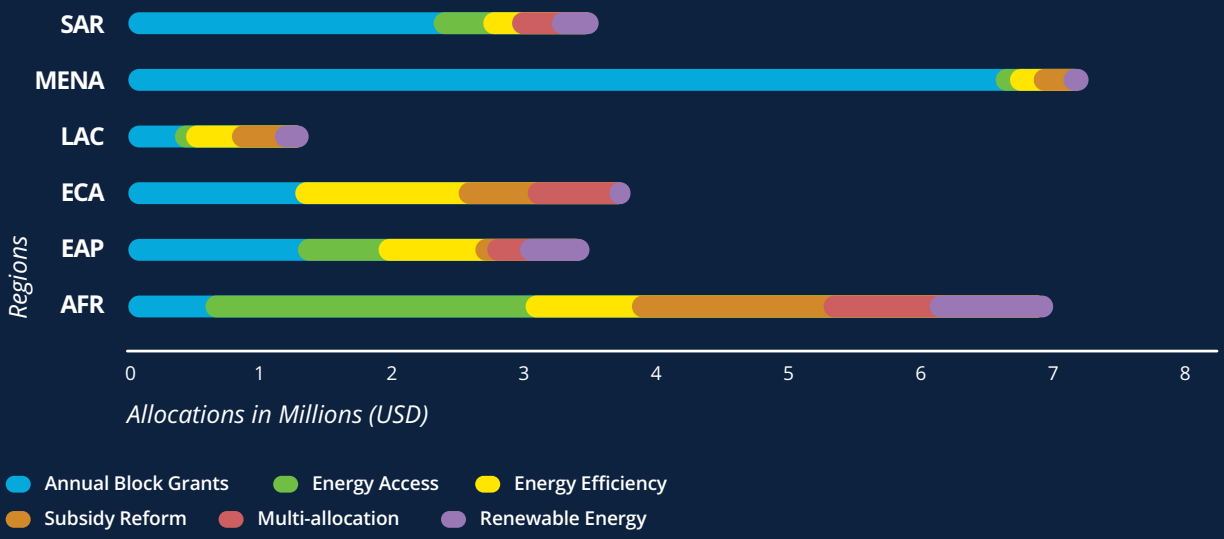
Number of Activities by Region



Grant Amount (US$ Millions)



FY2018 Grant Amount by Thematic/Cross-Cutting Area



OUR IMPACT

US $8.6 BILLION
World Bank development financing informed

Photo by © Aa Dil / Unsplash

- **US $7.0 BILLION**
  external funding mobilized, including private sector
- **72 MILLION**
  beneficiaries expected to be reached
- **2.2 GIGAWATTS**
  of renewable energy expected to be installed
- **56.5 MILLION**
  people provided with access to electricity
- **440 MILLION**
  metric tons of CO_2 emissions expected to be reduced
- **4.36E^8**
  MEGAWATT HOURS
  projected lifetime energy and fuel savings

The Impact Indicators are expected results of (a) World Bank lending operations approved in FY2018 informed by active/existing ESMAP activities and (b) active/existing World Bank lending operations informed by ESMAP activities approved in FY2018. The expected results are based on these lending operations.

LOOKING FORWARD

In FY2019, ESMAP will scale up its efforts in several areas to help low- and middle-income countries reach SDG7 and the Paris Agreement on Climate Change:

Offshore Wind

providing support to help countries develop bankable offshore wind projects for private investment and raising the concessional funding needed to carry out feasibility studies

Battery Storage

developing and implementing a US$5 billion WBG initiative to accelerate investments that help increase the share of renewable energy in grids, improve energy security, improve grid stability, and expand access to electricity

Efficient and Clean Cooling

in collaboration with the World Bank's Montreal Protocol team, supporting countries' efforts to scale up affordable, efficient clean cooling technologies through private and public-sector investments

Floating and Rooftop Solar

helping to increase investments in floating and rooftop solar to help countries expand solar deployment in land-constrained areas and closer to demand

Solar Risk Mitigation

in partnership with the International Solar Alliance (ISA), Agence Française De Développement (AFD), and other development partners, ESMAP is developing a Solar Risk Mitigation Initiative to reduce the cost of financing for and de-risk solar projects to further scale up solar energy use

Sustainable Hydropower

helping to manage risks through careful preparation of sustainable hydropower projects

Electrification of Transport

supporting countries to reduce the local and global environmental impact of the transport sector through electrification of transport based on clean power. It includes last-mile retrofits to transformers, so the grid can support clustered and/or high-power charging. It also considers new rate structures, business models, actors, services, development of charging infrastructure and standards, dynamic planning by utilities, and other aspects.

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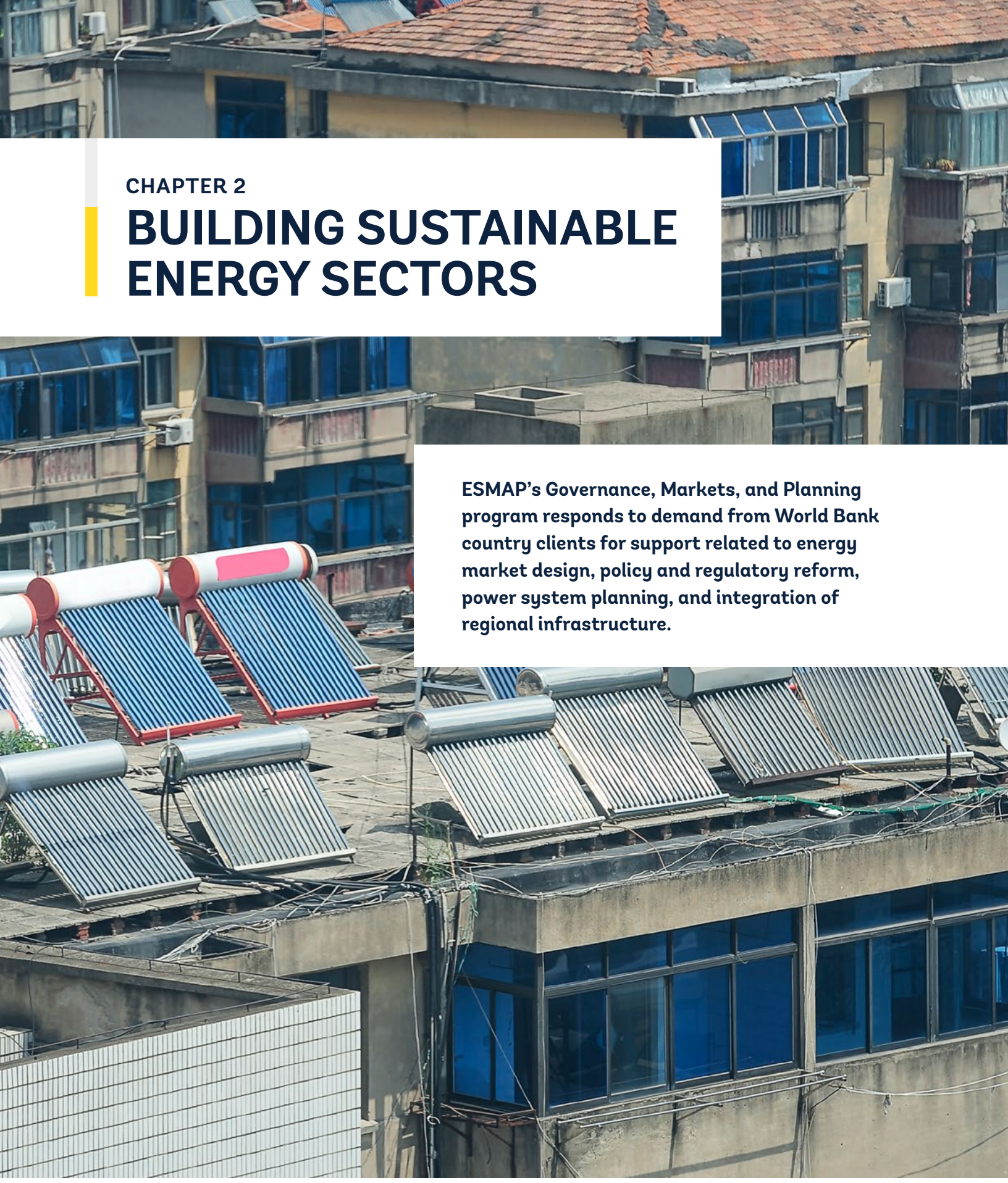
CHAPTER 2

BUILDING SUSTAINABLE ENERGY SECTORS

ESMAP's Governance, Markets, and Planning program responds to demand from World Bank country clients for support related to energy market design, policy and regulatory reform, power system planning, and integration of regional infrastructure.



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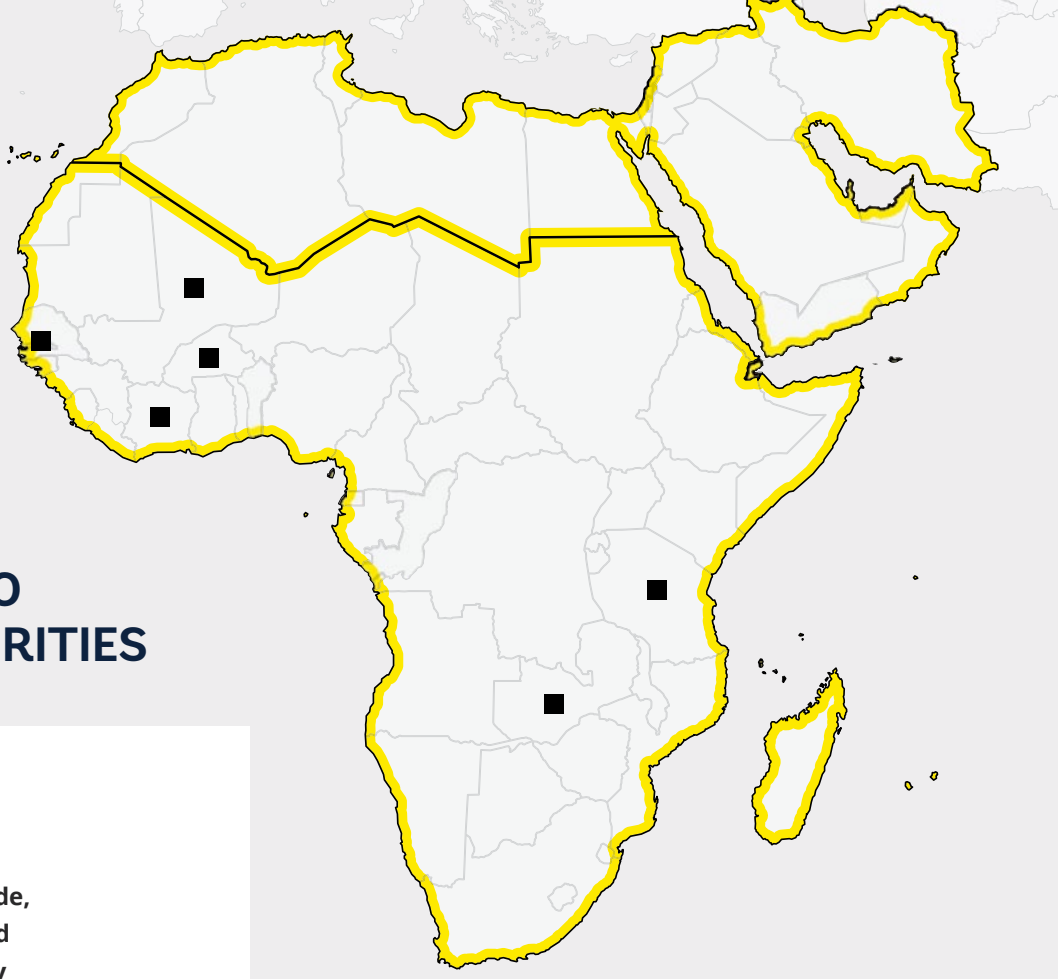


RESPONDING TO REGIONAL PRIORITIES

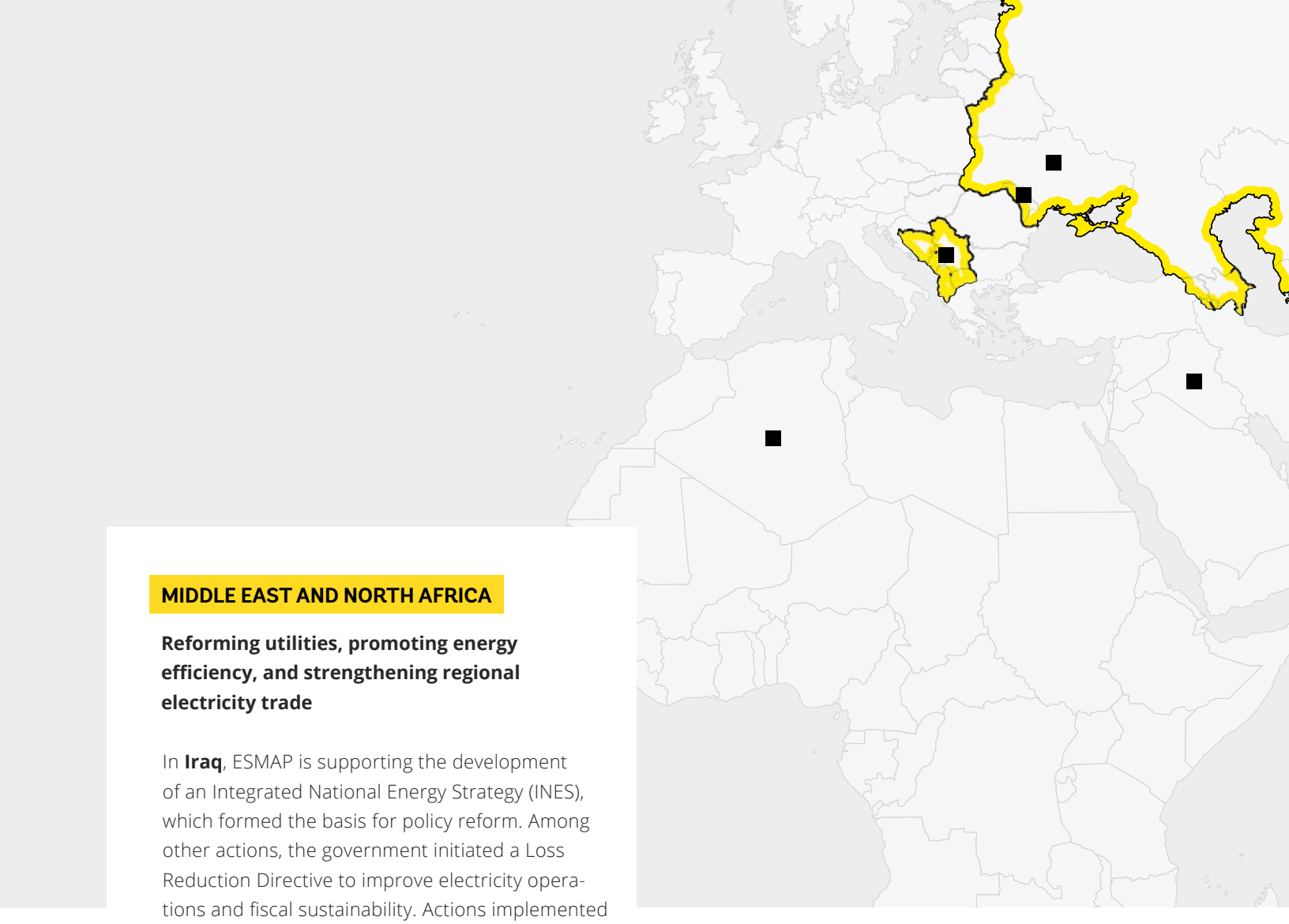
AFRICA

Boosting regional energy trade, expanding energy access, and supporting renewable energy

ESMAP is facilitating regional power trade in Sub-Saharan Africa through technical assistance and analytical work. In June 2018, the Economic Commission of West African States (ECOWAS) launched the regional power market, following large investments from strategic partners, including the World Bank. The aim is to physically connect the energy grids of 14 countries through the West Africa Power Pool by 2020. A major obstacle to building trust among trading partners is their uneven payment records. At the request of the Prime Minister of **Côte d'Ivoire**, ESMAP financed groundbreaking analytical work on the *Securitization of Payments for Cross-Border Power Trade*, which was crucial in establishing a West Africa Power Pool Task Force of senior representatives from power utilities to push this agenda forward. To boost energy trade between **Tanzania** and **Zambia**, ESMAP funded analysis to help develop a 400-kV interconnection line that will increase power transmission capacity to southern regions of Tanzania. Another analytical report helped to identify solar projects in **Burkina Faso, Mali**, and other countries to be financed by the World Bank.

Under the **Côte d'Ivoire** Electricity Access Scale-up Program, ESMAP funded a technical study and an investment prospectus for electricity access expansion in 15 priority cities in the country. This work has underpinned the implementation of the access component of the US$325 million World Bank Electricity Transmission and Access Project. It also secured US$60 million from the African Development Bank, West African Development Bank, and European Union for specific investments to increase access rates in the targeted cities from 25% to about 70%.

In **The Gambia**, a least-cost expansion plan, which included the optimal sizing of a grid-connected battery storage facility, has strengthened dialogue with the government and supported the development of the World Bank Gambia Electricity Restoration and Modernization project approved in FY2018. The project will finance construction of a 20 MW solar photovoltaic (PV) plant, potentially including a battery storage system to help manage supply and demand.



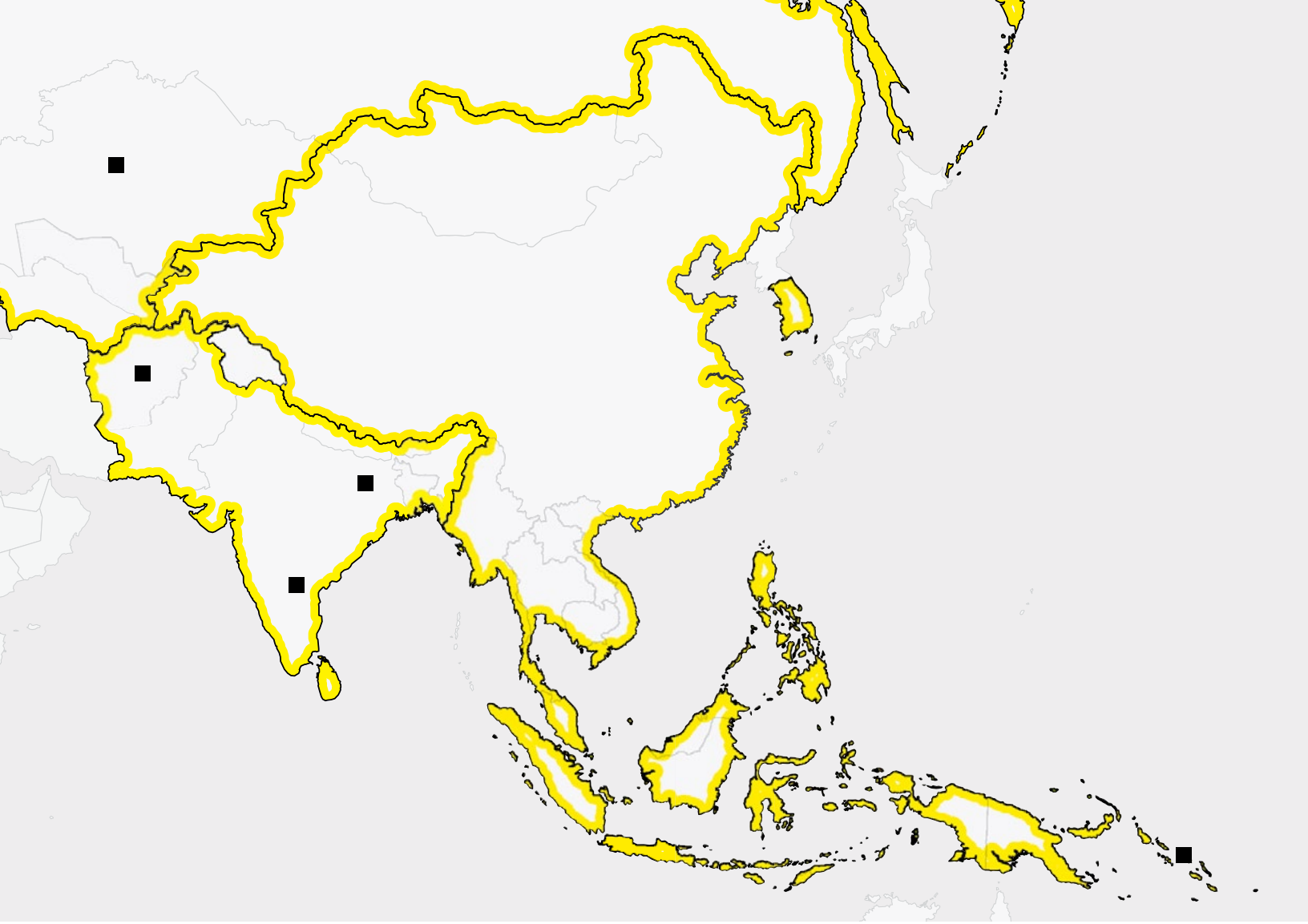
MIDDLE EAST AND NORTH AFRICA

Reforming utilities, promoting energy efficiency, and strengthening regional electricity trade

In **Iraq**, ESMAP is supporting the development of an Integrated National Energy Strategy (INES), which formed the basis for policy reform. Among other actions, the government initiated a Loss Reduction Directive to improve electricity operations and fiscal sustainability. Actions implemented under this directive include better electricity metering and revenue collection. Since the policy was enacted, the pilot areas in the city of Baghdad have expanded service delivery: revenue collection has increased dramatically (US$2.40 million/year compared with the US$0.54 million before), electricity usage has decreased (peak demand reduced from 50 MW to about 30 MW), and residents who once suffered from daily blackouts now enjoy round-the-clock electricity.

Within the context of the **Algeria Vision 2035**, ESMAP provided recommendations on energy consumption policies and actions over the next 20 years to help the country build a more energy efficient economy. These recommendations feed directly into the vision's New Economic Growth Model and the government's energy strategy, which seeks to reduce energy consumption over the next decade.

ESMAP's comprehensive support for the **MENA Pan-Arab Regional Energy Trade** initiative has resulted in key policy shifts. Two consultations were organized with the League of Arab States (LAS) and Member States in Kuwait and Tunisia. A high-level meeting in Cairo with the Arab Electricity Experts Committee further solidified the platform and discussed actions to strengthen trade in the region. An ESMAP-funded regional analysis covering 18 countries assessed the value of electricity trade under different scenarios. The findings from this analysis have been presented to the steering committee of the Pan-Arab Regional Energy Trade Platform, which oversees the creation of institutions and regulations to enable regional electricity and gas trade. The Member States and LAS have now launched an action plan that uses the electricity models and analytical tools developed by the World Bank to advance trade.



EUROPE AND CENTRAL ASIA

Improving energy supply, scaling-up energy efficiency and renewable energy, and supporting sector reform

In **Serbia**, a power systems study found that while Serbia's power grid is well-prepared to accommodate renewable energy, the country would need to move to feed-in premiums (FiPs) and auctions. Another analysis of the natural gas sector provided recommendations to improve the financial sustainability and efficiency of public enterprises under the US$400 million World Bank Public Expenditure and Public Utilities Development Policy Lending series and has informed the International Monetary Fund's economic program for the country. As a result of this work, the government enacted policies to improve utility governance, including the establishment of an internal audit committee, the adoption of an investment evaluation framework, and the rationalization of investment planning.

In **Kazakhstan**, ESMAP helped the cities of Almaty and Astana to plan and implement energy efficiency (EE) investment programs in municipal sectors through EE assessments (including use of the TRACE model). An ESMAP-funded study showed that each city can save millions of dollars annually by investing in EE in specific municipal service sectors. It also identified an investment pipeline of US$5.6 billion to be implemented using a new financing model. This model will be piloted with initial funding of US$2 million under the ongoing World Bank energy efficiency project.

An ESMAP analysis guided district heating (DH) tariff-setting in **Moldova** to cost-recovery levels. The DH regulatory and tariff-setting reform resulted in positive income for the DH company for the first time. This work represents the first building block in the development of a regulatory framework for the DH sector to provide adequate incentives and delineate a roadmap for financing major infrastructure investments.

An ESMAP evaluation of restructuring options for **Ukraine's** gas company, Naftogaz, and analysis of future electricity market prices has helped the government to unbundle Naftogaz and finalize the Wholesale Electricity Market Law. A follow-up ESMAP activity is now providing support to implement reforms in the gas sector. In addition, the government has made progress in defining a comprehensive strategy for modernizing the district heating sector.

EAST ASIA AND THE PACIFIC

Supporting infrastructure benefiting communities

In the **Solomon Islands**, ESMAP underpinned the preparation of the new US$2.8 million Community Benefit Sharing Pilot Project supported by the World Bank/Japan Social Development Fund. The project aims to benefit more than 4,000 people in the Bahomea and Malango communities of Guadalcanal through the establishment of a fund as well as investments in water and electricity infrastructure. It will also ensure that community members gain employment under the planned Tina River Hydropower Development Project, also informed by ESMAP. Significant co-financing from donors and partners was also mobilized with ESMAP support. This include US$86 million from the Green Climate Fund, US$31.6 million from the government of the Republic of Korea, US$15 million from the Abu Dhabi Fund for Development, and US$12.7 million from the government of Australia.

SOUTH ASIA

Strengthening policies and modernizing institutions

ESMAP helped **India's Andhra Pradesh** state to strengthen and modernize its electricity distribution companies. More specifically, it funded the preparation of a roadmap for information and communication technology (ICT) development for power distribution utilities and helped build institutional capacity. Collectively, this work informed the design of the US$240 million World Bank Andhra Pradesh 24x7 Power for All Project. Support for institutional improvements was also provided to **Jharkhand** *(Support to 24x7 Scheme for Jharkhand)*, which helped design a series of reforms expected to be incorporated in an upcoming World Bank project.

In **Afghanistan**, in addition to strengthening client capacity and broadening the analytical knowledge base in the energy sector, findings of the ESMAP-funded Afghanistan Energy Study contributed to the preparation of two key lending projects in the country: the Afghanistan Herat Electrification Project and the Afghanistan Incentive Program Development Policy Grant for a combined investment of almost US$400 million.

LATIN AMERICA AND THE CARIBBEAN

Reforming institutions and supporting geothermal development

In **Brazil**, ESMAP supported analysis on *Revisiting the Power and Gas Sector Reform* to assess market challenges and recommend legal and financing models in these sectors. Conclusions on power sector reform and long-term financing were used in the preparation of the FY2018 Financial Instruments for Brazil Energy Efficient Cities (FinBRAZEEC) project to help attract private investment at scale in efficient street lighting and industrial energy efficiency for a total of US$1.3 billion.

ESMAP has also supported studies to expand geothermal development in Chile, Mexico, Nicaragua, and St. Lucia, and which contributed to the development of the World Bank's pipeline of geothermal investments in the region.

Energy Transition in Asia

The global effort to meet the ambitious 2ºC climate target agreed in Paris will need to address new coal-fired power capacity. Six Asian countries account for almost 80% of the global new coal-fired power capacity currently under construction or at advanced planning stages: China, India, Indonesia, Pakistan, the Philippines, and Vietnam. The World Bank has committed to allocate substantial IBRD and IDA resources (which could, in turn, leverage private investment) for scaling up renewable energy and energy efficiency in these countries to support their energy transition. The World Bank is also aiming to mobilize concessional resources and strengthen financing partnerships with bilateral and regional multilateral development banks. ESMAP is supporting these country programs by allocating US$12 million for policy support and technical assistance.

Over the past year, ESMAP's activities haves informed several new World Bank clean energy operations in four of the six countries. These operations include:

INDIA

ESMAP is supporting the US$300 million India Energy Efficiency Scale-up Program — a US$220 million Program for Results (PforR) loan and US$80 million guarantee — for efficient ceiling fans and LED lights, and the US$625 million IBRD/Clean Technology Fund co-financed Grid Connected Solar Rooftop Program, that will add at least 100 MW of solar rooftop capacity to the grid to help meet India's target for 40 GW of solar rooftop installations.

PAKISTAN

ESMAP is supporting the Sindh Solar Energy Project that will facilitate 400 MW of utility-scale solar capacity through the construction of solar parks and competitive bidding.

INDONESIA

ESMAP is supporting the upcoming Geothermal Resource Risk Mitigation Project that will establish a risk-sharing mechanism for geothermal development to unlock public and private resources with the aim to add around 1 GW of geothermal capacity before 2030.

VIETNAM

ESMAP is supporting the US$102 million World Bank Vietnam Energy Efficiency for Industrial Enterprises project, which is complemented by an US$86 million Green Climate Fund (GCF) guarantee designed with ESMAP's support.

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CHAPTER 3

SPEEDING UP THE RACE TO ACHIEVE UNIVERSAL ENERGY ACCESS

Photo by © Lutendo Malatji / EyeEm / Getty Images

The amount needed to achieve universal electrification by 2030 is around US$45 billion per year (Tracking SDG7 Report, 2018). As public and development financing are not sufficient to close this gap, ESMAP is leading a significant effort to help countries design ambitious electrification programs that mobilize private investment and help them tap into global and local financial markets.

Working closely with governments, ESMAP ensures that these programs include components to reduce risks for the private sector to enter the market, such as geospatial tools to identify low-cost electrification options through solar home systems, mini grids and grid extension, market intelligence and investment prospectuses, up-to-date business delivery models, and productive uses of electricity to promote economic and human development. ESMAP supports these programs with reliable resource assessments, and provides assistance to strengthen policy and regulatory environments. In addition, ESMAP helps governments design financing facilities that offer working capital and results-based financing to enable mini grid and off-grid service providers to jump-start the market and leverage other sources of funding.

ESMAP's transformative approach has formed the basis for the design of several World Bank projects that are now channeling funding to accelerate efforts and help countries reach universal access by 2030. These projects include the US$150 million Kenya Off-Grid Solar Access Project, the US$350 million Nigeria Electrification Project, the US$375 million Ethiopia Electrification Program, the US$50 million Rwanda Renewable Energy Project, the US$50 million Niger Solar Electricity Access Project, and the upcoming Regional Off-Grid Electrification Project in Africa, all of which are expected to leverage an additional US$1–2 billion in public and private resources over the next few years.

1 BILLION PEOPLE
live without electricity

Mobilizing Finance for Efficient, Clean Cooking and Heating

Nearly 3 billion people — more than 40% of the world's population — **lack access to clean cooking and heating.**

Household air pollution is responsible for about 4 million premature deaths a year with estimated welfare losses being a staggering US$1.52 trillion annually.

Greenhouse gas emissions from wood fuels alone amount to about 1.9–2.3% of global CO_2 emissions. If current trends continue, 2.3 billion people will continue to use traditional cooking methods in 2030.

Lagging furthest behind the SDG7 targets is access to efficient, clean cooking and heating (ECCH) — an area that has been consistently overlooked by policy makers. Developing sustainable markets for ECCH and accelerating adoption of technologies has been hampered by lack of financing, slow technological progress, low consumer awareness, and lack of infrastructure for fuel and stove production and distribution. **ESMAP's ECCH program** is working to change this by providing policy advice, mobilizing investment, and piloting innovative approaches to attract concessional and private sector funding.

ESMAP'S ECCH PROGRAM MOBILIZED MUCH OF THE WORLD BANK'S LENDING PORTFOLIO

- The World Bank's **US$300+ million** lending portfolio spans **14 countries**, including Bangladesh, China, Djibouti, Ethiopia, Kenya, the Kyrgyz Republic, Mongolia, Senegal, and Uganda.
- Programs under this portfolio are benefiting **over 3.6 million households — over 18 million people** — with improved access to more efficient, cleaner cooking and heating solutions.

Mobilizing Concessional and Private Financing through Innovation

Through innovative results-based financing (RBF) schemes — an approach designed to help countries deliver basic services to low-income communities that makes payments to a service provider only after services have been delivered, and meet quality standards — ESMAP has helped private companies to enter the clean cookstoves market in **Bangladesh**, **China**, **Indonesia**, **Kenya**, **Lao PDR**, and **Uganda**. Progress was made in Uganda, where a US$2.2 million ESMAP grant is helping to mobilize new investors and new technologies and to strengthen the value chain and commercial distribution through five new business consortiums. In **Bangladesh**, the existing cookstove program under the World Bank RERED II project has been completed, reaching 1 million households by September 2017, two years ahead of schedule. With ESMAP funding and technical assistance, the project has mobilized US$20 million of concessional financing from the **Green Climate Fund** (GCF) and US$20 million from IDA funding for the scale-up program with the aim of reaching 4 million households by December 2021. Through Africa Clean Cooking Energy Solutions (ACCES), ESMAP helped design the US$8 million ECCH component in the Kenya Off-Grid Solar Access Project. ESMAP technical assistance also enabled the World Bank to start engaging in dialogue with Djibouti, Ethiopia, The Gambia, Ghana, Guinea-Bissau, Senegal, and Zambia.

In **Lao PDR**, ESMAP supported an RBF pilot to introduce 50,000 "super clean stoves" — the most advanced gasifier stoves available that meet World Health Organization standards for indoor air quality — and to make them affordable to consumers. In **Indonesia**, another ESMAP-supported RBF pilot promoted innovation in business models such as

offering consumer incentives through credit and payment plans and bundling discounts for stoves and fuels. Over 10,000 clean stoves have been sold by 10 new private companies entering the market including 5 led by women. With ESMAP support, Indonesia is now upgrading standards for cookstoves to adopt a pioneering testing method that incorporates local cooking practice — known as the Indonesia Clean Stove Initiative–Water Heating Test.

In the **Kyrgyz Republic**, stove prototypes were tested in 70 low-income households. Training of local stove producers enabled the development of high-performance stoves, which saved about 50% in fuel, reduced emissions by more than 90%, and kept homes warm. Now, a household can save about US$100 every winter. Building on the success of the pilot, ESMAP helped design a US$5 million ECCH component to scale up efforts in the World Bank US$46 million Heat Supply Improvement Project.

Accelerating Electrification with Better Planning and Geospatial Tools

Focusing mostly on high electrification-deficit countries, **ESMAP's SEforALL Technical Assistance** (TA) program helps countries develop electrification and investment plans, use geospatial tools for least-cost planning, and syndicate financing for scaling up mini grid and off-grid solutions.

GEOSPATIAL MAPPING is changing the face of electricity planning. With unprecedented detail and accuracy on unserved populations, geospatial data are being used to identify which technology to use where.

By working with ESMAP's Global Facility on Mini Grids and Lighting Global, SEforALL TA strengthens collaboration between governments and the private sector, and incentivizes local companies to expand services to more remote areas that are difficult to reach. For example, in **Kenya**, the program helped develop a geospatial electrification plan to underpin a new National Electrification Strategy. This plan has attracted government financial support for mini grids and off-grid electrification in areas not prioritized for a grid connection. It also laid the groundwork for a US$150 million World Bank project, aiming to bring electricity through off-grid solar solutions to marginalized communities beyond the grid. In parallel, Lighting Global helped design an innovative financing facility to enable off-grid businesses to expand their reach to remote northern Kenya, while ESMAP's Global Mini Grids Facility promoted dialogue with the private sector. The project aims to reach 14 remote communities in the northeastern part of the country through off-grid solutions, mini grids, and clean cookstoves; it expects to serve about 1.3 million people, reaching homes, schools, and health centers.

Putting Mini Grids at the Forefront of the Access Race

Photo by © World Bank

Over the past year, ESMAP's Global Facility on Mini Grids has made mini grids an important part of World Bank energy lending operations.

25 **WORLD BANK PROJECTS** now include US$445 million worth of investment in mini grids.

SO FAR, ABOUT

193 **MINI GRIDS HAVE BEEN BUILT ACROSS 7 PROJECTS**

connecting over 175,000 people in Bangladesh, Benin, Ghana, Haiti, Kenya, Myanmar, and Tanzania.

Expected over the next five years:

These projects will mobilize **an additional US$1.1 billion** for mini grids from governments, the private sector, and other donors.

They will deploy another **2,400 mini grids** to bring electricity to more than **5 million people.**

Ethiopia and Nigeria have adopted similar approaches that are now beginning to pay off. In **Ethiopia,** the roll out of connections in the ambitious National Electrification Program (NEP) will be based on the latest geographic information system (GIS) platform, which uses geospatial data to identify the optimal technology solution in space and time. As part of the NEP, ESMAP also supported an investment prospectus to mobilize financing to the sector. In **Nigeria**, ESMAP-funded geospatial electrification tools provided free data on viable mini grid sites to help private sector developers to enter the market. The geospatial data are used to prepare investment plans to be financed under the World Bank Nigeria Electrification Project.

The SEforALL TA program is continuing its collaboration with a consortium of partners led by Sweden's KTH Royal Institute of Technology to develop a global geospatial planning platform to guide country policy dialogue and investments.

As a result of the comprehensive support provided by ESMAP, the Nigeria Electrification project mentioned above, allocated US$150 million for 850 solar hybrid mini grids, which are expected to bring electricity to 1.5 million people, as well as 30,000 small businesses. The design of the mini grid component incorporates regulations to enable private sector participation, market insight for 250 mini grid sites mapped by using geospatial planning tools, an electronic platform for minimum subsidy tenders, and incorporation of productive uses through collaboration with agriculture and business development programs.

As electrification speeds up, the issue of equitable access becomes a priority to ensure that no one is left behind. Kenya is one example where ESMAP's comprehensive support helped tackle this issue. Support of mini grids helped the government to roll out an electrification plan using a GIS-based database, targeting the poorest, most marginalized counties, which enabled the identification of 120 mini grid sites in the Kenya Off-grid Access Project for Underserved Counties.

ESMAP has also focused on helping countries to strengthen policies for a successful mini grid scale-up. In **Tanzania**, ESMAP collaborated with the electricity regulator to develop the third-generation mini grid regulations and provided insights on private mini grid operators, national policies and subsidies through surveys and assessments. Collectively, this work now informs the Tanzania Rural Electrification Expansion Project, which leverages US$155 million in public and private funds to build over 280 new mini grids by 2022. In **Rwanda**, ESMAP has been working with the electricity regulator within the framework of the Rwanda Renewable Energy Fund to develop a second-generation simplified licensing framework for mini grids; in **Haiti,** it is supporting the World Bank Haiti Renewable Energy for All and Modern Energy Services for All projects by helping to draft a tripartite agreement.

In FY2018, the Facility's Action Learning Event in Abuja, Nigeria attracted 600 participants including private sector developers, regulators, state governments, communities, distribution companies, and development partners, building on the momentum gained from previous years' learning events in Kenya, Myanmar, and Tanzania.

Lighting Global: Off-Grid Solar Products Continue to Benefit Millions

Lighting Global is a flagship initiative of the World Bank Group that aims to build sustainable markets for off-grid solar products for households, productive, and community use. The initiative collaborates with Global Off-Grid Lighting Association (GOGLA), manufacturers, distributors, governments, and other partners to develop the modern off-grid energy market. ESMAP is renewing and continuing its support to Lighting Africa and has expanded the World Bank support for off-grid energy activities in other regions such as South and East Asia.

Lighting Global is currently supporting World Bank operations that aim to expand access to off-grid energy solutions in 28 countries. Since last year, ESMAP has been helping countries to promote equitable access to energy by providing incentives to off-grid companies to expand their services to poorer, more remote areas that are harder to reach. Specific work under Lighting Global is often combined with other ESMAP programs such as the Global Facility on Mini Grids, SEforALL Technical Assistance, and Solar Scale-Up to address the multifaceted challenges of scaling up off-grid solar energy.

For example, in the **Kenya** US$150 million World Bank project previously mentioned, Lighting Global helped design a loan facility for importers and retailers of solar systems to incentivize them to enter the most remote, underserved markets. In the World Bank **Nigeria** Electrification Project, it

Photo by © Solar Aid

supported the design of a US$75 million results-based grant facility to expand off-grid electrification. It also supported the design of the World Bank **Pakistan** Sindh Solar Energy Project, particularly on the deployment of affordable solar home systems in areas with low or no access to electricity. Analysis was provided to identify priority areas and enhance consumer awareness and financial literacy, and on product quality, and monitoring and evaluation. Support was also provided to the World Bank **Haiti** Renewable Energy for All Project, which aims at scaling-up renewable energy investments to expand access to electricity for households, businesses, and community services.

Assistance to IDA projects in **Burkina Faso, Ethiopia, Mali, Rwanda, Uganda**, and **Zambia** 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.

In FY2018, the Global Off-grid Solar Market Trends Report, co-published with IFC, GOGLA (Global Off-Grid Lighting Association), and Dalberg was launched to provide insights to investors, policy makers, and other stakeholders. ESMAP/Lighting Global contributed to GOGLA's guidance note to governments summarizing best practices on the role of governments in supporting the market. ESMAP was the main sponsor of the Global Off-Grid Forum and Expo in Hong Kong in January 2018, with nearly 700 participants from 65 countries, including industry experts, donors, private sector representatives, and country governments. In addition, ESMAP/Lighting Global sponsored the Unlocking Solar Capital Conference in Abidjan and co-organized a learning event in Washington, DC to facilitate dialogue between the World Bank project teams and the private sector, represented by GOGLA and several of its member companies.

LIGHTING GLOBAL'S IMPACT

165

MILLION PEOPLE

have benefited from using quality verified solar lighting products

44.5

MILLION PEOPLE

have had their basic lighting needs met

33

MILLION QUALITY VERIFIED PRODUCTS

have been sold since 2009

3.3

MILLION TONS

of GHGs have been avoided annually

Removing Obstacles 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. Weak policy and regulatory frameworks often hamper the delivery of energy services in these areas. ESMAP's **Energy Access for the Urban Poor** program provides customized solutions to countries to help increase energy access to the urban poor, bridge knowledge gaps, and work with communities to raise public awareness of electrification options.

In FY2018, the program supported the **Democratic Republic of Congo**, **Dominican Republic**, **Tanzania**, and **Yemen**, aiming to rehabilitate, modernize, and reconstruct their distribution grids. Knowledge and expertise of slum electrification initiatives around the world were consolidated in a series of case studies on **Nairobi**, **New Delhi**, **Rio de Janeiro**, and **São Paolo**. The case studies focus on utilities in these cities and describe how their new and comprehensive customer programs have incentivized bill payments and promoted legal access.

As part of the World Bank Kenya Slum Electrification Project, a survey based on ESMAP's Multi-Tier Framework (MTF) is being carried out in the slum areas of Nairobi to help understand the drivers of success in slum programs and the quality of energy access in these communities.

In **Buenos Aires, Argentina**, the initiative helped to promote social and urban integration of the Villa 31 settlement under the World Bank's Metropolitan Buenos Aires Urban Transformation project. With the help of ESMAP's Energy Efficiency program, public buildings were supported and government capacity in deployment of solar thermal and photovoltaic has been increased through training. In **Haiti**, the program assisted the power utility, Electricité d'Haiti, to regularize informal connections in selected areas and improve access to street lighting in the low-income neighborhoods of Port-au-Prince under the World Bank's Rebuilding Energy Infrastructure and Access project.

Photo by © Peter Berko / Unsplash

A Different Way to Measure Energy Access — the Multi-Tier Framework (MTF)

Having an electricity connection does not necessarily mean having access to electricity. Many factors can affect the quality, reliability, and affordability of electricity services households receive. MTF measures the multi levels of service and groups households into pre-defined tiers, painting a more complete picture of the factors affecting access. This makes MTF a powerful tool for informing policy and investment decisions and guiding targeted interventions. MTF global energy surveys are being carried out in countries with the greatest access deficit including **Bangladesh**, **Cambodia**, **Democratic Republic of Congo (Kinshasa District)**, **Ethiopia**, **Kenya**, **Honduras**, **Liberia**, **Madagascar**, **Myanmar**, **Nepal**, **Niger**, **Nigeria**, **Pakistan**, **Rwanda**, **São Tomé and Príncipe**, **Uganda**, and **Zambia**. Countries such as Ethiopia and Rwanda are now using MTF data to shape their targets and policies, while Cambodia and Myanmar are using indicators such as "households" "willingness to pay" and "consumption of different fuels" to quantify the private investment needed in the sector. The global MTF report is forthcoming in FY2019.

Country Diagnostic Reports Released in FY2018

RWANDA

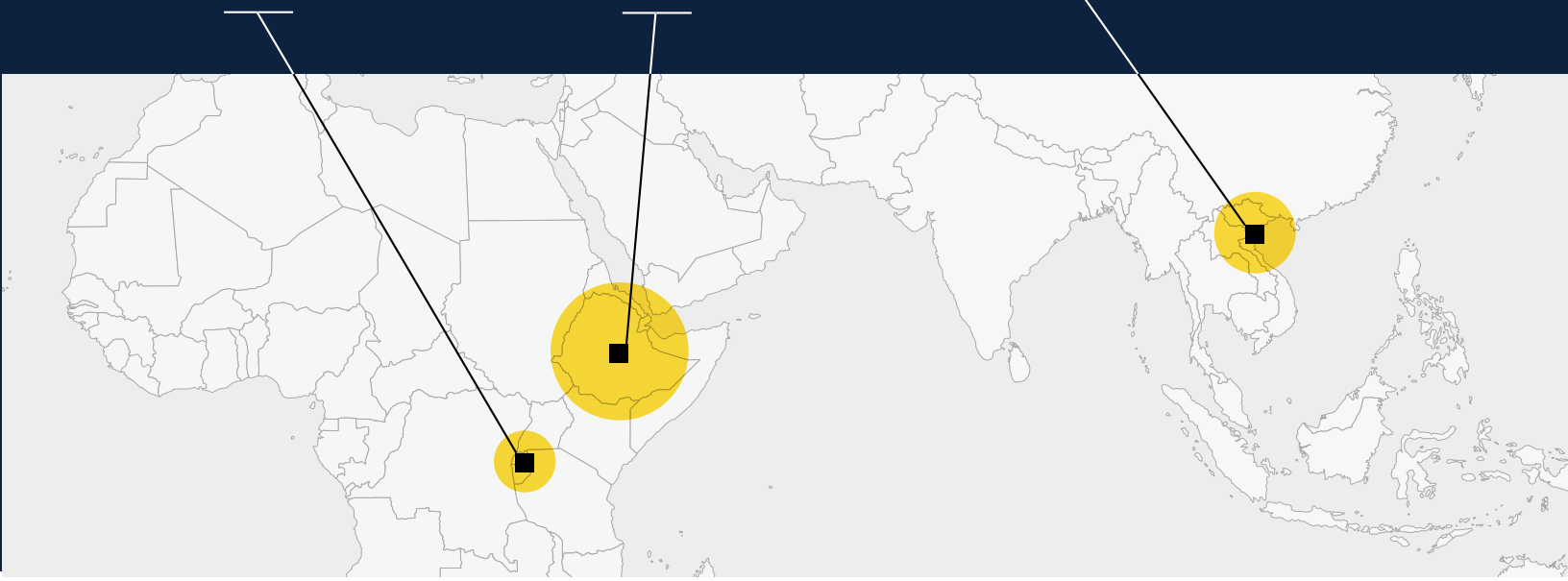
Rwanda has made impressive gains in access to electricity rates, jumping from 10% in 2010 to 43% in 2018 — approximately 27% of households have at least basic access to electricity (Tier 1+).

ETHIOPIA

57% of households have access to at least one source of electricity. About 33% have access via the national grid, while 24% — mostly in rural areas — have access through off-grid solutions.

CAMBODIA

About 98% of Cambodian households have access to at least one source of electricity, 71% on the grid, and 26% off the grid.



CHAPTER 4

SETTING THE STAGE FOR RENEWABLE ENERGY EXPANSION AT SCALE

Photo by © Sappono / Getty Images

Trillions of dollars are needed to help countries transition to a low-carbon, climate resilient development. Over the past two years, the World Bank has directly supported or integrated 18 GW of renewable energy into electricity grids and mobilized over US$10 billion in commercial finance for clean energy. ESMAP has been a central part of this effort. Its Renewable Energy (RE) program helps countries assess their renewable resource potential, determine how solar and wind can be integrated into their power systems, and scale up investments in geothermal and solar energy.

Transforming the Geothermal Industry

ESMAP's Global Geothermal Development Plan (GGDP) continues to create a strong pipeline of geothermal exploration projects in the World Bank and other development banks. As a result of the GGDP, the World Bank is currently implementing six projects totaling US$710 million in **Armenia, Chile, Djibouti, Ethiopia, Indonesia**, and **Turkey**. Another four projects are under preparation in **Dominica, Indonesia, Nicaragua**, and **St. Lucia**.

In FY2018, ESMAP supported the development of Kenya's National Geothermal Strategy as part of the government's efforts to add 2,200–2,900 MW of geothermal generation by 2035.

Building on the Geothermal Energy Upstream Development Project in **Indonesia**, ESMAP has helped to define a technical assistance program for the upcoming World Bank Geothermal Resource Risk Mitigation Project to confirm the resource. This assistance has also enabled stakeholder consultations around the power purchase agreement process to help strengthen policies for more private sector participation.

To help countries in **Latin America** understand their geothermal potential, ESMAP completed a study in FY2018 on Opportunities and Challenges for Scaling Up Geothermal Development, which has formed the basis for dialogue and influenced governments to embrace risk mitigation options and cost-sharing schemes. The study led to a series of knowledge exchange events, including the Geothermal Congress for Latin America and the Caribbean (GEOLAC) with several countries sharing experiences. Lastly, as a key sponsor of the Iceland Geothermal Conference, ESMAP partnered with the Icelandic Ministry of Foreign Affairs and Iceland Geothermal to organize a session to celebrate the fifth anniversary of the GGDP. The event brought together more than 600 participants from across the global geothermal industry, private sector, and academia, as well as country representatives.

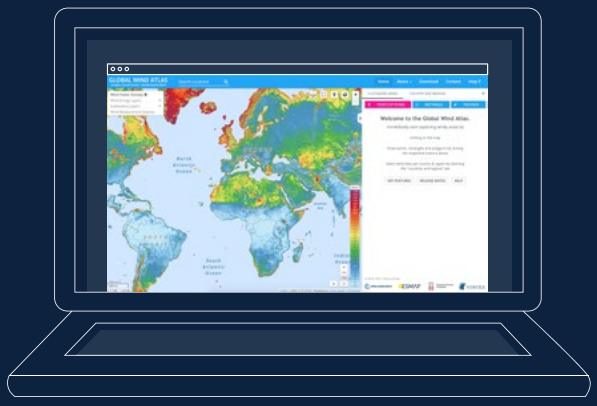
Promoting Accessible Renewable Energy Data

ESMAP's **Renewable Energy Resource Assessment and Mapping** program has promoted the shift from country-based mapping to a global approach that provides a single point of access to high-quality data on solar and wind resources. Two free, web-based data tools — the Global Solar Atlas and Global Wind Atlas — now provide rich, nationwide data to governments, private developers, research organizations, and others.

Global Solar Atlas

A free, web-based tool with 1 km global resolution and high-quality solar maps for all 146 developing countries:

- More than 9,000 users per month from around the world (average, as of June 2018)
- Developing countries represent more than half of the top 25 countries using the site



Global Wind Atlas

(Launched in FY2018), a free, web-based tool to help policy makers and investors identify promising areas for wind power generation:

- The latest modeling technologies combine wind climate data with high-resolution terrain information to provide wind climate data at a 1 km scale
- High-resolution global and regional maps and geographic information system (GIS) data enable users to print poster maps and use the data in other applications

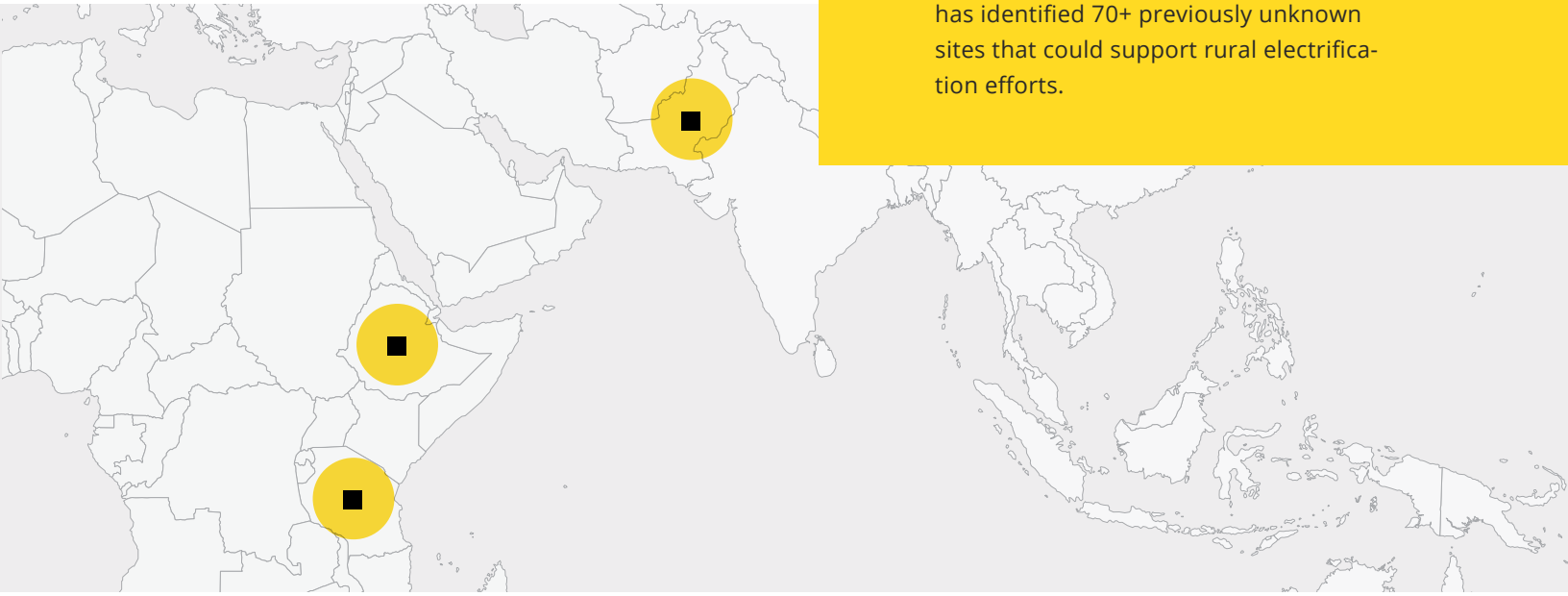
The RE Mapping program has funded solar and wind measurement campaigns in 11 countries, generating high-accuracy data that is now freely available on the World Bank's ENERGYDATA.info platform. Working closely with ESMAP's Solar Scale-up and Variable Renewable Energy Grid Integration programs, RE Mapping is now focusing on identifying opportunities to use this data in power sector planning and least-cost electrification plans, particularly in geospatial analyses where data on resource potential can help identify the best sites.

As part of **Zambia's** solar auction under the World Bank's Scaling Solar initiative, an ESMAP-funded solar and wind resource mapping campaign has provided critical data to help solidify solar resource estimates by private developers and in bid preparation. Approximately 100 MW of solar has been awarded so far, with further auctions planned. The World Bank is providing a guarantee to one of the two winning projects that will leverage approximately US$48 million in private investment to finance a 34 MW peak solar PV power plant by Ngonye Power Company Limited.

The wind mapping results for **Vietnam** have helped identify resources that were not previously known in the center and north of the country and have highlighted a substantial offshore wind resource in the south of the country. This information will help Vietnam to explore future wind power development, building on the 200 MW of capacity installed so far.

OTHER RE MAPPING EFFORTS COMPLETED OR UNDERWAY

- A wind mapping measurement campaign in **Ethiopia** is currently being integrated with a broader WBG engagement to help identify and develop multiple sites.
- In **Pakistan**, wind and solar maps have highlighted huge resources in Balochistan with potential for development. The country has completed both biomass and solar mapping, with a wind measurement campaign underway.
- In **Tanzania**, small hydropower mapping has identified 70+ previously unknown sites that could support rural electrification efforts.



> **"There is great scope in many countries for the clean, low-cost power that wind provides, but they have been hampered by a lack of good data. By providing high-quality resource data at such a detailed level for free, we hope to mobilize more private investment for accelerating the scale-up of technologies like wind to meet urgent energy needs."**
>
> — *Riccardo Puliti, Senior Director and Head of the World Bank's Energy and Extractives Global Practice*

Modernizing Grids for More Renewable Energy

ESMAP's **Variable Renewable Energy (VRE) Integration Program** seeks to remove barriers to successful integration of solar and wind through grid modernization, battery storage options, adoption of new control and forecasting technologies, revamped business models for utilities, and updated policies and regulations.

The program has laid the groundwork for several World Bank investments. For example, an assessment of the static and dynamic stability of **Mongolia's** Western Energy System under larger shares of variable renewable energy (VRE) capacity, recommended revising the National Grid Code that is now being designed under the World Bank Second Energy Sector Project. The assessment is also used to inform the construction of a 10 MW solar PV plant under the project.

Battery storage is another area gaining momentum as a viable option for successful integration of VRE — especially solar — into weak networks. In the **Central African Republic**, ESMAP helped develop a cost-effective solar and battery storage model to help integrate solar into weak grids. This analysis underpinned a US$50 million IDA project consisting of a 25 MWp/25 MWh combined solar PV-battery storage plant.

ESMAP activities have also underpinned significant policy shifts. In Armenia, a new distribution grid code was used to define the connection requirements for the first solar project in the country, the 55 MW Masrik-1 Solar Farm. This helped pave the way for a successful solar auction in the country that awarded the tender to the lowest bidder in May 2018 at US$0.0419/kWh. An integration analysis for Niger's Zinder solar power plant has provided insights on the available connection capacity, which is now informing the deployment of IFC's Scaling Solar program in the country.

In **Central America**, a regional program is supporting dispatch centers to build VRE forecasting capacity and adequate ancillary services. Starting with **Guatemala**, where system reserves were overdimensioned, ESMAP helped to upgrade the methodology used to calculate spinning reserve requirements. The new methodology has already been adopted by the local dispatch center and is estimated to save US$40 million. Based on this success, support is being extended to **Costa Rica, El Salvador, Honduras, Nicaragua**, and **Panama** with the goal of putting in place regional regulations and createing a regional market to exchange operating reserves.

As part of the World Bank's ambitious, US$750 million plan to help **West Africa** scale up solar energy, ESMAP is helping the **West African Power Pool** grid to expand its solar PV capacity to increase access to electricity and meet a growing demand. An analysis taking into account availability of solar resources and interconnection, expected demand, and access to other generation sources has laid the basis for regional planning for building solar PV capacity, minimizing regional generation costs. Country-specific modeling of power flow with solar PV and battery plants was also carried out in **Burkina Faso, Côte d'Ivoire, Ghana**, and **Mali**.

ESMAP's collaboration with the Korea Green Growth Trust Fund (KGGTF) has leveraged an additional US$2.1 million for four activities in the **Central America and West Africa** regions, as well as in **Peru**, **Sri Lanka**, and **Vietnam**.

Promoting New Approaches to Solar Deployment

ESMAP is helping countries to expand **solar power** through support for structuring solar parks and transitioning to competitive bidding/auctions. In FY2018, the program initiated several new activities and developed core knowledge on emerging areas such as rooftop photovoltaic (PV) and floating solar. It has also helped respond to demand for customized approaches, including hybridization of solar PV with batteries and hydro-connected solar PV.

In **Pakistan**, initial recommendations from a previous ASTAE-funded study fed into the design of the US$100 million IDA Sindh Solar Energy Project to facilitate 400 MW of utility-scale solar capacity through the construction of solar parks and competitive bidding. To better assess Pakistan's renewable energy resources, 9 solar stations and 12 wind masts were installed across the country, measuring and collecting solar and wind data for two years.

As part of a broader ESMAP engagement comprising RE Mapping, VRE integration, and rooftop solar, technical assistance helped the government of **Vietnam** to develop a solar strategy, which formed the basis for the government's request for further assistance by the World Bank to prepare a pilot solar auction. This significant shift in policy could create a market for solar power and bring down prices to help the country accelerate the pace of solar deployment to meet it targets. In parallel, an ESMAP-funded geospatial analysis has helped to identify available land for solar PV deployment.

To help **Haiti** tap into its rich sources of renewable energy and increase electricity access, a US$20 million Climate Investment Fund grant is helping to attract private investment. ESMAP funding helped the government identify potential on-grid investments by analyzing and modelling the integration of solar PV energy and battery systems into the national utility's smaller grids, serving provincial capitals and secondary cities. The analysis identified viable investments, which were prioritized in the World Bank project. In addition, it identified the key regulatory constraints for grid-connected solar energy and outlined ways to address them. A specific assessment of renewable energy potential contributed to the government's decision to eliminate import duties for several renewable energy products.

CHAPTER 5

ENABLING COUNTRIES TO HARNESS THEIR ENERGY EFFICIENCY POTENTIAL

Photo by © Soham Sahu / EyeEm / Getty Images

Cities consume 66% of global energy and produce 70% of greenhouse gas (GHG) emissions. Over 55% of electricity use is linked to buildings and 65% of oil is linked to transport. Making urban services and buildings more energy efficient can mitigate climate change and contribute to the achievement of the Sustainable Development Goals (SDGs), especially SDG7. ESMAP's Energy Efficiency (EE) program focuses on Energy Efficient City Services and Energy Efficient and Sustainable Buildings to help countries address financial and policy gaps while working to prioritize EE across sectors such as transport and water. In FY2018, the EE program's activities provided support to more than 30 countries across the developing world, shaping EE plans for city services and buildings.

Mobilizing Private Investment for EE through Innovative Financing and Delivery Models

- ESMAP's EE program addressed this challenge in the **Western Balkan** countries of Bosnia and Herzegovina, Kosovo, the former Yugoslav Republic of Macedonia, and Montenegro, where unexploited EE potential in buildings is significant. For example, in **Montenegro**, ESMAP was instrumental in the design of an innovative financing model that captures energy cost savings and reinvests them in EE — a sustainable aspect that can attract commercial financing. This innovation formed the basis of the World Bank US$7.4 million Montenegro Second Energy Efficiency Project to fund EE retrofits in hospitals and clinics.

- ESMAP's work in **Brazil** is another example of helping to mobilize private investment. Based on the program's previous work that helped identify viable business models for urban EE sectors, the WBG approved in FY2018 the Financial Instruments for Brazil Energy Efficient Cities (FinBRAZEEC) project to help attract private investment at scale in efficient street lighting and industrial EE for a total of US$1.3 billion. ESMAP was also instrumental in securing US$195 million for FinBRAZEEC from the Green Climate Fund (GCF).

- To help **India** transform its EE market, the WBG approved the $300 million India Energy Efficiency Scale-up Program — a US$220 million Program for Results (PforR) loan and US$80 million guarantee — for efficient ceiling fans and LED lights, the most common appliances used in homes and offices. ESMAP-funded assessments and technical assistance provided critical input to the results framework and action plan of the PforR loan. It also informed the design of India's Energy Efficiency Services Limited (EESL) ambitious EE plan for high-efficiency air conditioning and water pumping.

Facilitating EE Scale-up through Effective Policies, Regulations, Building Codes, and EE Standards

- In **Vietnam**, an ESMAP-funded assessment of options to enhance industrial EE recommended a shift from a voluntary to a mandatory approach linked to EE standards and targets, which was adopted by the government. Implementation of these options are now financed in part by the US$102 million World Bank Vietnam Energy Efficiency for Industrial Enterprises project, which is complemented by an US$86 million GCF guarantee designed with ESMAP's support.

- In **Uzbekistan**, ESMAP technical assistance underpinned the US$200 million World Bank Energy Efficiency Facility for Industrial Enterprises Project by helping lower the market barriers for businesses through a key-equipment-supplier approach. ESMAP also helped develop a measurement and verification system for project results, including energy savings and emission reductions, a key step for mobilizing private investment.

- In **Central America**, ESMAP is supporting the implementation of green building codes, energy standards, and labeling for appliances such as air conditioners, while promoting public communications and capacity building. Collectively, these efforts are now enabling the design of an EE fund.

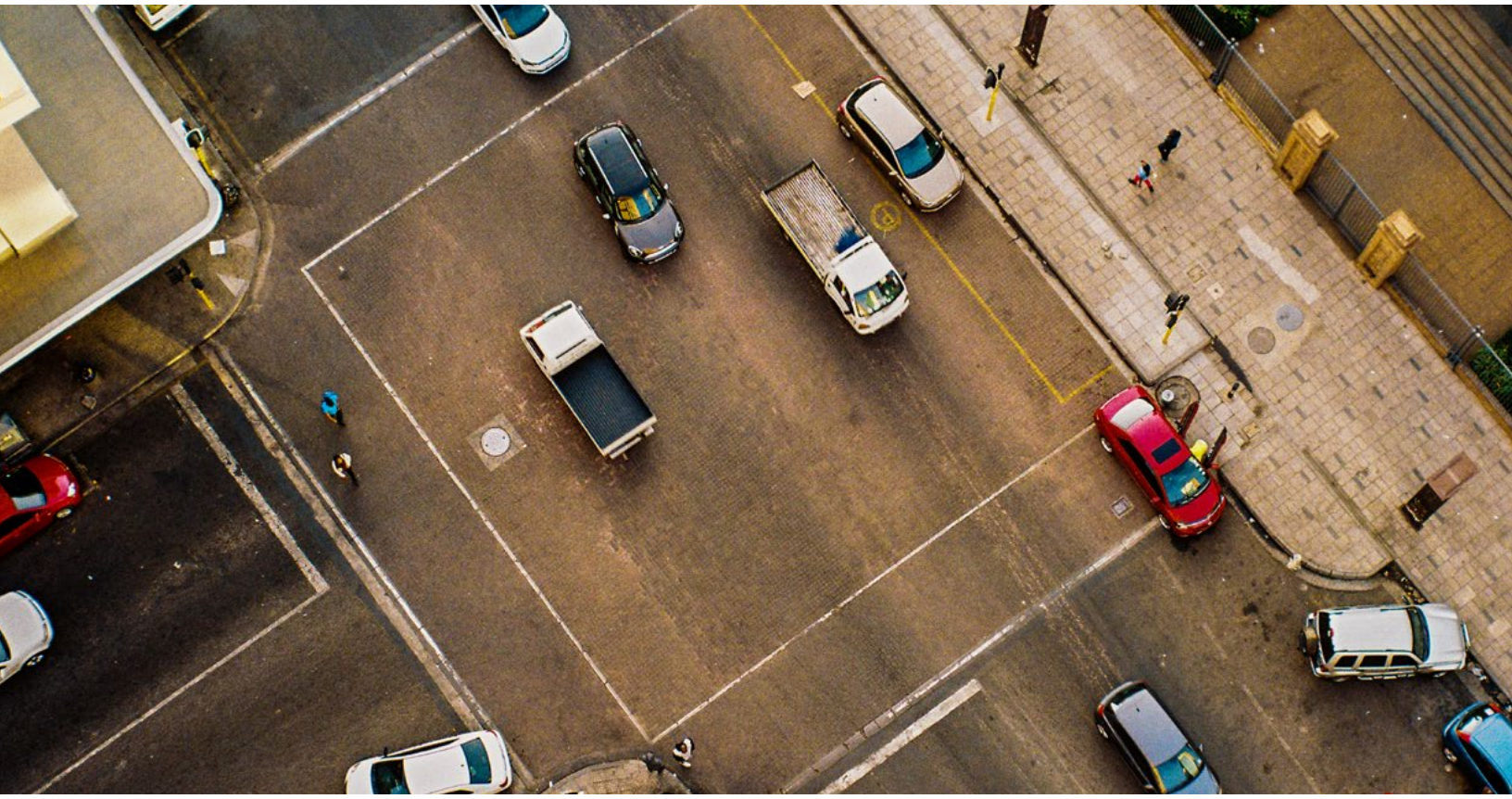


Photo by © Hermandt / Getty Images

Making Urban Sectors Such As Water, Buildings, and Transport More Energy Efficient

- An ESMAP-funded audit of eight water supply utilities in **Liaoning, China** identified areas where EE can be improved and outlined investment opportunities. Its recommendations are now being financed by the Liaoning Safe and Sustainable Urban Water Supply Project.

- In the **Kyrgyz Republic**, an ESMAP-funded urban heating assessment recommended policy measures and priority investments that have underpinned the World Bank Heat Supply Improvement Project, a US$46 million endeavor to improve the lives of more than 200,000 people in Bishkek through better and more reliable heating. ESMAP also helped to mobilize an additional US$4 million in co-financing from the government of Switzerland to enhance EE and seismic resilience in public buildings.

- In **Morocco**, ESMAP supported the design of the country's Lighting Transformation Program, defining the institutional, technical, financial, contractual, and legal aspects of a national program to scale up an energy-efficient and sustainable public lighting system. The program is expected to result in significant energy savings and GHG emissions reductions.

- Building on previous engagements in **Mexico**, ESMAP continued its technical support focusing on mainstreaming EE in public schools and hospitals by including them in the financing and operational mechanism for EE. This support has underpinned the US$50 million World Bank Additional Financing for Energy Efficiency in Public Facilities Project.

- Within the context of **Ukraine's** sustainable mobility effort, ESMAP funded a roadmap for improving accessibility and energy efficiency in **Odessa's** public transport system. The city now has a solid foundation to improve customer service delivery and ensure financial sustainability, while reducing operational costs.

The ESMAP report on Assessing and Measuring the Performance of Energy Efficiency Projects highlights good monitoring and verification practices and the need to consider the multiple benefits of EE. These efforts helped identify investments to be financed by an EE fund designed with ESMAP support.

CHAPTER 6

REFORMING ENERGY SUBSIDIES IN A SUSTAINABLE WAY

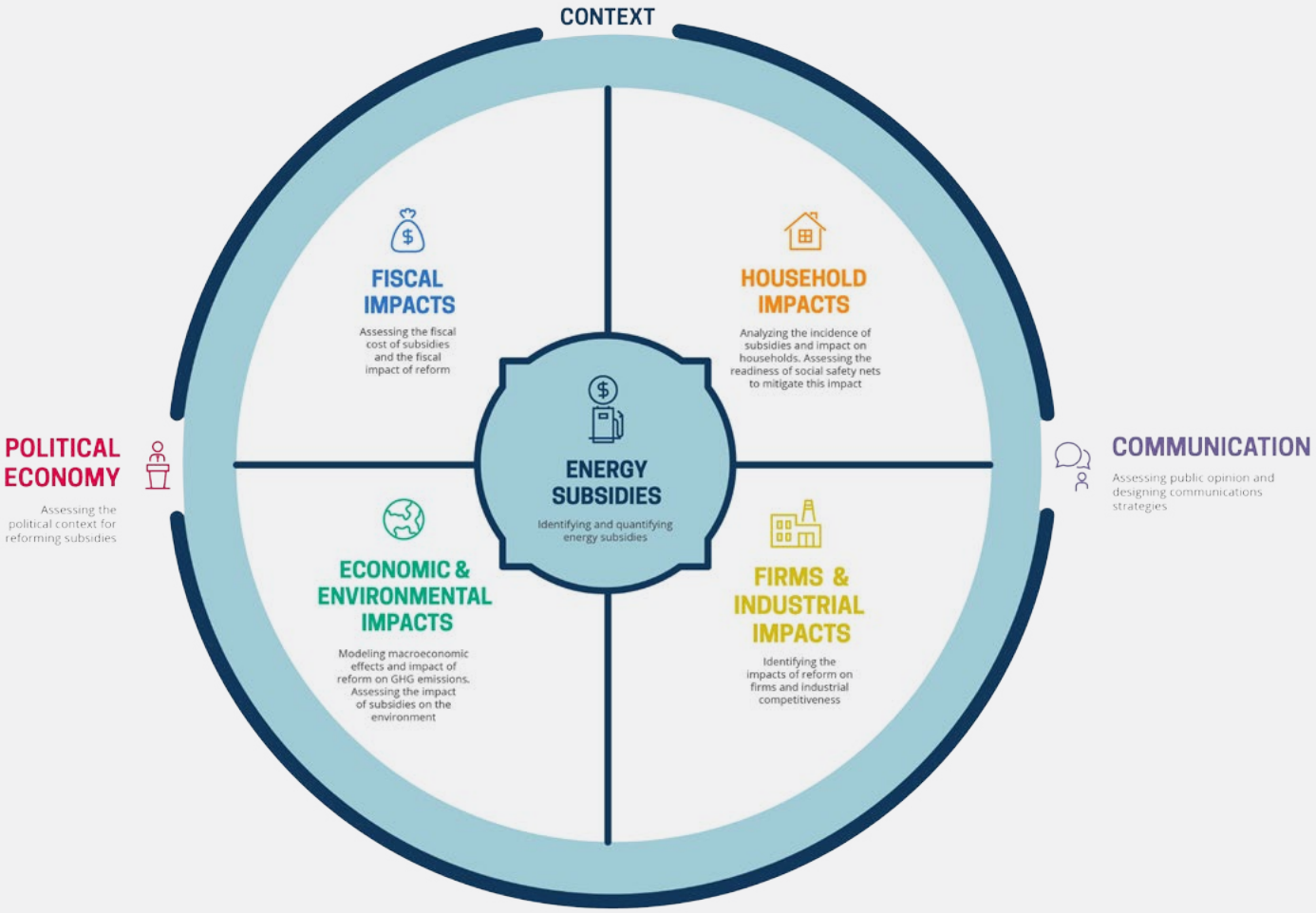
In 2017, about US$300 billion was spent on fossil fuel subsidies globally — almost six times the amount required to achieve universal access to electricity and clean cooking by 2030. Often, energy subsidies disproportionately benefit higher income groups, while diverting the amount of public money that could be invested in health, education, and infrastructure. They also undermine global efforts to reach the climate change goals as 13% of global CO_2 emissions has been linked to the use of subsidized fossil fuels for consumption (IEA).

ESMAP's Energy Subsidy Reform Facility (ESRF) supports governments in reducing or reforming energy subsidies. Since 2014, the facility has allocated US$16 million for technical assistance that has supported about US$9.6 billion of World Bank development financing. The facility's work supports the achievement of Sustainable Development Goal 12c (SDG12c) to phase out inefficient fossil fuel subsidies. In FY2018 alone, US$3.8 million worth of activities has helped 17 countries and two regions design, implement, and solidify reforms. Technical assistance and analysis resulted in policy shifts in **Algeria**, **Madagascar**, **Rwanda**, and **Tunisia**. It also underpinned US$2.54 billion in development policy financing (DPF) for programs in **Egypt**, **Jordan**, **Madagascar**, and **Tunisia**.

Photo by © Thomas Hafeneth

THE LAUNCH OF THE ENERGY SUBSIDY REFORM ASSESSMENT FRAMEWORK

Reforms cannot be accomplished unless governments address the issue in a holistic manner. ESMAP has published a comprehensive toolkit (the Energy Subsidy Reform Assessment Framework or ESRAF) to help countries design energy subsidy reforms, while understanding the impact of reform on the poor, the wider economy, and the environment. ESRAF comprises an Overview and Ten Good Practice Notes that present key issues for policy analysis and essential diagnostic tools. They also provide hands-on guidance on how to conduct relevant assessments, including of the political and social barriers to reform, and the design of effective public communication.



Ensuring Sustainable Reforms through Long-term Support

In the **Middle East and North Africa (MENA)**, where price subsidies on fuels are common but often not well-targeted or cost-effective, ESMAP has supported several countries in the design of socially responsible reforms.

For example, in Egypt, ESMAP has been supporting the government in addressing the economic and social aspects of getting energy prices right. In FY2018, these efforts culminated in the delivery of an Energy Pricing Strategy by the World Bank for its clients and a report making the case for stronger social safety nets. Technical assistance was also provided on a 5-year tariff plan for electricity, pricing reforms for fuel, and Egypt's new gas law. Collectively, this work has formed the basis for designing key aspects of the US$1.1 billion World Bank Third Fiscal Consolidation, Sustainable Energy, and Competitiveness Programmatic DPF, which aimed to reduce energy subsidies as a percentage of GDP from 6.6% in FY2013–14 to 3.2% in FY2017–18.

A Policy Note and simulations of the impact of proposed price increases — both carried out with ESMAP support — have informed the design of policy actions in **Tunisia's** US$500 million Investment, Competitiveness, and Inclusion DPF. Under the DPF a first round of electricity and gas tariff adjustments has been enacted, with the target of decreasing energy subsidies from 1.8% of GDP in 2017 to 1.5% of GDP in 2019. The government has now adopted a policy to eliminate subsidies in the sector by 2022.

ESMAP funded the development of a roadmap to mitigate the negative impact of electricity tariff reforms on the poor, which has underpinned **Jordan's** First Equitable Growth and Jobs DPF. The roadmap also guided government pilot programs on energy efficiency, targeting the poor to support the country's goal of reducing cross-subsidies in the power sector and moving to cost recovery tariffs in five years.

In **Algeria**, ESMAP technical assistance has supported a US$1 million World Bank Reimbursable Advisory Service program to reform subsidies and social transfers. The World Bank is now working with the government to prepare the progressive elimination of subsidies and to design a targeted cash transfer program that will help to prepare for the progressive elimination of petroleum subsidies.

ESMAP increased its support for energy subsidy reform in Africa in FY2018. In **Madagascar**, ESMAP technical assistance helped Malagasy authorities to transition to automatic price adjustment for gasoline, diesel, and kerosene. This was a crucial part of the US$45 million Public Finance Sustainability and Investment DPF to strengthen Madagascar's fiscal framework and improve the investment climate. ESMAP assistance also informed the design of Rwanda's First Programmatic Energy Sector DPF by updating the projections of the fiscal and financial impact of expanding the electricity sector. This has laid the groundwork for consecutive DPFs to adopt options for a fiscally sustainable expansion of the sector. In the medium-term, budget transfers to the electricity sector will be maintained below 1.4% of GDP while efficiency and affordability of electricity services will be continuously improved.

To further facilitate knowledge exchange across countries that are considering or have gone through energy subsidy reforms, ESMAP organized 9 knowledge-sharing events and published 43 analytical reports covering 18 countries, 1 regional report on the Middle East and North Africa, as well as 3 country briefs. ESMAP collaborated with other partners to organize an event at COP23 in Bonn, Germany, which brought together country representatives to share their experience in designing and implementing energy subsidy reforms. It also co-sponsored the Annual Conference of Ibero-American Energy Regulators to bring subsidy reform to the forefront and engage regulators on the topic.

Photo by © Westend61 / Getty Images

CHAPTER 7

CLOSING GENDER GAPS

Strengthening Women's Role in the Sector

ESMAP's Gender and Social Inclusion program is helping to strengthen women's roles as consumers, employees, and entrepreneurs in the energy sector. Over the past year, ESMAP has made gender equality an integral part of its entire portfolio, focusing on areas such as geothermal energy, mini grids, energy efficiency and behavior change, and clean cooking.

ESMAP established six regional programs in Gender and Energy. As a result, over 40 World Bank energy projects now include actions to address gender inequality.

AFRICA

supporting over 25 IDA energy projects across 13 countries **(Benin**, **Comoros**, **Democratic Republic of Congo**, **Côte d'Ivoire**, **Ethiopia**, **Kenya**, **Liberia**, **Niger**, **Nigeria**, **São Tomé and Príncipe**, **Senegal**, **Tanzania**, and **Uganda)**, to help them close gender gaps related to access, productive uses of energy, and employment.

EAST ASIA PACIFIC

continuing support to **Indonesia, Lao PDR, Myanmar, the Philippines, Tuvalu**, and **Vietnam**, on issues such as technology adoption, service delivery, and women in technical and leadership roles.

EUROPE AND CENTRAL ASIA

focusing on communication and awareness-raising campaigns among women to ensure equal access to energy efficiency benefits in countries such as **Belarus**, **Bosnia and Herzegovina**, **the Kyrgyz Republic**, **Montenegro**, **Serbia**, **and Turkey**

LATIN AMERICA AND THE CARIBBEAN

focusing on the geothermal sector, women's safety, and the development of the female talent pool in countries such as **Brazil**, **Haiti**, and **St. Lucia**.

MIDDLE EAST AND NORTH AFRICA

promoting skills-building and electricity service delivery among rural populations and women in countries such as **Iraq** and **Morocco**.

SOUTH ASIA

focusing on female employment gaps in the power sector across **Bhutan**, **Bangladesh**, **India**, **the Maldives**, **Nepal**, **and Sri Lanka** through baseline assessments and dialogue for establishing a regional network.

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In FY2018, ESMAP's Gender Program capitalized on a transformational opportunity to bridge gender gaps across **Ethiopia's** entire energy sector. Ethiopia still has some of the lowest gender equality indicators within Sub-Saharan Africa — particularly in infrastructure sectors such as energy. With support from the WBG and ESMAP, the government has launched a major reform of its energy sector to reach universal electrification by 2025, which also ensures equitable institutions and equal benefits for women. Working together with teams from across the World Bank, the program spearheaded a first-of-its-kind approach — Closing Gender Gaps Across Ethiopia's Energy Sector — that looked at gender equality across the entire US$1.5 billion World Bank energy portfolio in the country, rather than project by project. Stakeholder consultations identified key discrepancies between opportunities for women and men and shaped national policy by incorporating specific actions in Ethiopia's National Electrification Program. This has leveraged substantial resources for action on women's employment, gender-based violence, child care and female entrepreneurship. The country team received the World Bank President's Award for Excellence for its pioneering work to close gender gaps across Ethiopia's electricity sector.

A social approach piloted in the **Comoros** has helped the public energy utility reduce commercial losses, such as nonpayment of bills, illegal connections, and meter tampering. A behavioral analysis and mapping exercise evaluated gender, social, and trust dynamics related to these losses. Two pilot programs partnered with local women's organizations to sensitize communities and raise awareness among 5,000+ energy customers. Through face-to-face advocacy, the women's groups were able to build trust and improve accountability among community members. As a result, 32% of unpaid bills have been collected from customers with low-voltage disc meters and prepaid meters, and the number of outstanding bills dropped by 79% in 100 days in the two pilot regions. A considerable spike in new bill payments has also been observed.

ESMAP technical assistance helped **Vietnam's** Energy Company (EVN) to put in place policies to hire qualified women at every level of the workforce and make progress on closing key employment gaps. ENV aims to increase the share of women in leadership positions from 12.7% to 14.2% between 2015 and 2020 (approximately 185 new female leaders). Through the rollout of a Women in Leadership and Mentoring Program, surveys show that EVN has achieved early progress with an increase in female recruitment at the director level from 0% to 10% and women in management from 16.2% to 17.1%. The company is also on its way to become certified in Economic Dividends for Gender Equality (EDGE) — the leading global assessment methodology and business certification standard for gender equality.

A new report, *Getting to Gender Equality in Energy Infrastructure*, looks at the social and gender impacts of large electricity projects, such as hydropower and concentrated solar plants. ESMAP is working with an array of partners to help identify gender data and indicators to inform the SDG7 Tracking Report. Collaboration has been strengthened with SEforALL's People-Centered Accelerator, which supports gender equality, social inclusion, and women's empowerment.

CHAPTER 8

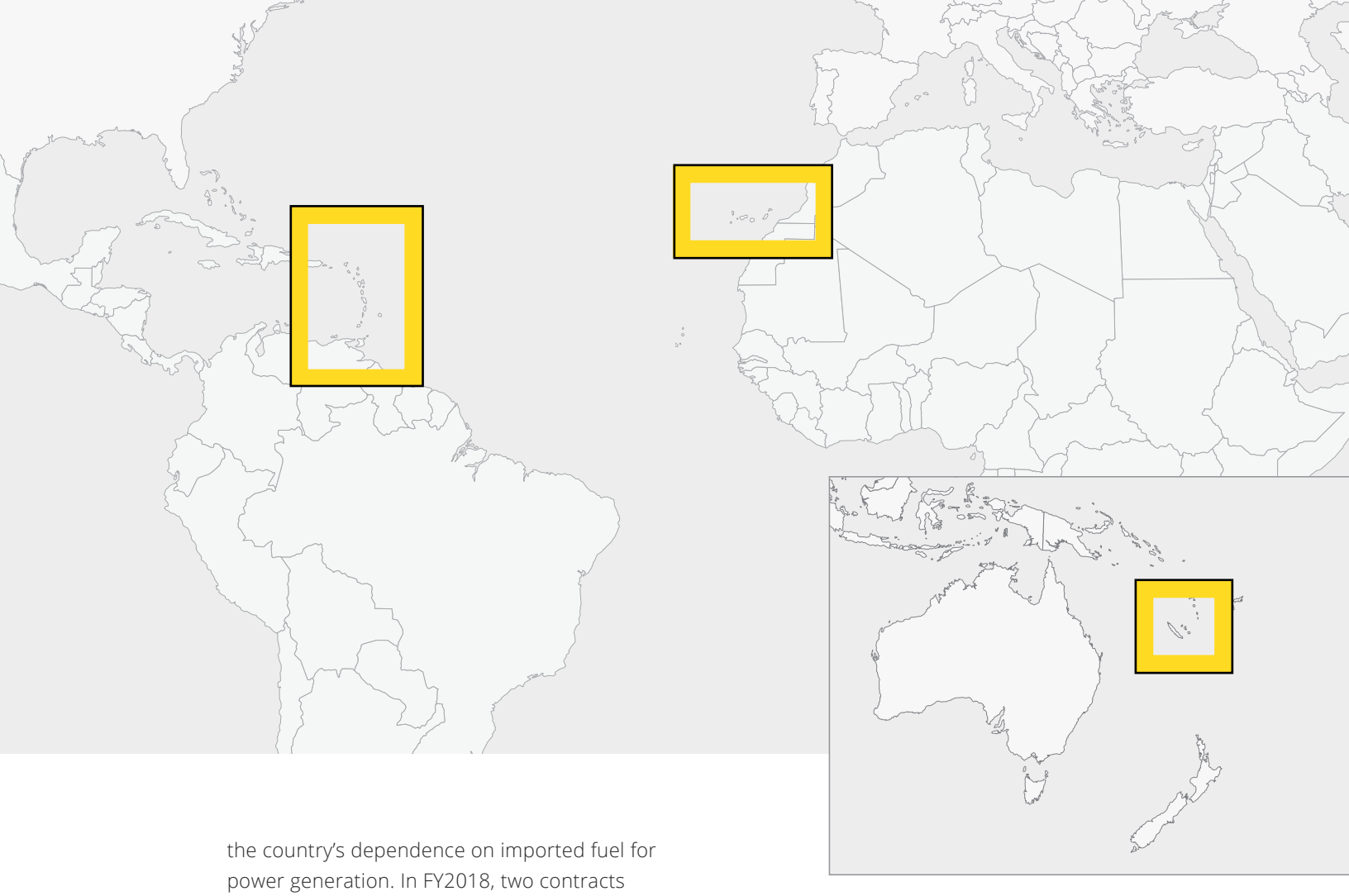
BUILDING ENERGY RESILIENCE IN SMALL ISLAND DEVELOPING STATES

Small Island Developing States (SIDS) function within a unique energy context. Relying heavily on imported fossil fuels, they are vulnerable to oil price shocks, supply interruptions, and high electricity costs. At the same time, SIDS are most affected by climate change impacts, which also pose significant risk to their current energy systems. Renewable energy holds a promise for SIDS to build resilience and secure sustainable energy. Many SIDS are pursuing new investments and embracing innovative technologies to scale up renewable energy. Estimates show that as of 2016, over 2 GW of renewable technologies were deployed on SIDS. With another US$43 billion of investment by 2030, an additional 66 GW of renewables can come online.

Unlocking Investments in Renewable Energy

ESMAP's SIDS DOCK Support program is a US$22 million effort, funded by Denmark and Japan, to help SIDS tap into their tremendous renewable energy potential and create sustainable energy sectors. Through a US$12.5 million active portfolio over the past two years, the program has helped countries such as **Dominica**, **Grenada**, **St. Lucia**, and **St. Vincent and the Grenadines** to advance solar photovoltaic (PV) deployment and geothermal energy development.

- In **Dominica**, ESMAP support has enabled the World Bank to provide extensive technical assistance to the government to develop the country's geothermal resources. Specifically, it helped establish benchmarks for the development of the Wotten Waven-Laudat field and identify key steps to meet industry practices and international standards. The successful completion of the exploration and drilling led to the development of the upcoming World Bank Dominica Geothermal Risk Mitigation Project to finance the construction of a 5–7 MW plant. The government plans to expand the plant's capacity to 40–100 MW for future electricity exports to neighboring islands.
- Technical assistance on environmental and safeguard practices helped the government of **St. Lucia** to inform investors' decision to finance geothermal exploration. The positive outcome of the surface exploration activities led to the preparation of an upcoming World Bank project on exploration drilling for the development of a 30 MW geothermal power plant. An additional ESMAP grant and a GEF grant will help address significant barriers to geothermal development.
- Under the World Bank Tuvalu Energy Sector Development Project, the ESMAP SIDS grant aims to enhance energy security by reducing



the country's dependence on imported fuel for power generation. In FY2018, two contracts were completed for the renewable energy investments (700 kW solar PV facility and 1 MWh energy storage system) and a wind project to be tendered by September 2018.

- In **Cabo Verde**, as part of the World Bank Distributed Solar Energy System project, ESMAP has financed the provision and installation of 300 kW PV systems in six regional hospitals and the installation of two solar water heater systems in the two main hospitals. Through this activity, it is supporting the Ministry of Energy to strengthen regulations for distributed generation and funding a market assessment to encourage distributed energy investments in the country.

On a regional level, SIDS DOCK is supporting the **Organization of Eastern Caribbean States (OECS) Countries Solar PV Demonstration and Scale Up Project**, a regional initiative focusing on scaling up commercial rooftop PV systems. The project will establish at least one commercial-scale rooftop PV pilot of 200 kW in **Grenada**, **St. Lucia**, and **St. Vincent and the Grenadines**. The World Bank is working with governments on the design of scalable models to expand the use of renewables in each country.

The Caribbean Regional Energy Initiative (CREI) C-SERMS Platform has organized several outreach activities and knowledge exchange events and workshops to convene stakeholders on finding ways to strengthen energy resilience in the region. The Caribbean Energy Resilience Workshop in October 2017 attracted more than 50 participants, including regional utilities, government officials, private sector representatives, and development partners. An energy data platform is currently underway along with a climate risk screening exercise to identify power system vulnerabilities in **St. Lucia** and **St. Vincent and the Grenadines**.

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CHAPTER 9

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. [1]

Contributions

In FY2018, ESMAP received a total of US$47 million from 10 donors, including the World Bank, a 16% increase from FY2017 receipts. SIDS DOCK did not receive any contributions in FY2018. Contributions in FY2018 included preferenced financing for World Bank operations, including recipient-executed activities, in Tunisia (EUR 5.5 million from Italy), Kyrgyz Republic (US$4.0 million from Switzerland), and St. Lucia (GBP 3.6 million from UK DFID) Table 9.1 presents actual receipts in FY2018 from individual donors for the MDTFs, as well as cumulative receipts since FY2017, the start of the FY2017–20 ESMAP Business Plan. In FY2018, Italy joined as a new ESMAP donor. At the end of FY2018, ESMAP has mobilized US$148 million for its FY2017–20 Business Plan, compared to the target of US$215 million.

TABLE 9.1: Donor Contributions to ESMAP and SIDS DOCK MDTFs, FY2017–18 (US$ thousands)

	FY2018 Paid-in Contribution/Receipts		ESMAP FY2017–18			FY2012–18
Donor	**ESMAP**	**SIDS DOCK**	**Cumulative Pledges**	**Cumulative Receipts**	**Cum. Receipts over Cum. Pledges**	**SIDS DOCK**
Australia			1,154	1,154	100.0%	
Austria						
Canada						
Denmark	4,093		22,459	14,976	66.7%	7,093
Finland			144	144	100.0%	
France						
Germany, *of which*	339		9,685	7,716	79.7%	
• *BMUB*			*7,344*	*7,344*		
• *BMZ*	*339*		*2,342*	*373*		
Iceland	300		2,333	1,733	74.3%	
Italy	6,054		6,054	6,054	100.0%	
Japan						15,000
Lithuania						
Luxembourg			1,124	1,124	100.0%	
Netherlands	8,152		37,078	28,925	78.0%	
Norway	4,119		7,754	7,754	100.0%	
Rockefeller Foundation			250	250	100.0%	
Sweden	7,401		20,772	15,254	73.4%	
Switzerland	8,050		12,050	8,050	66.8%	
United Kingdom	8,329		26,053	11,952	45.9%	
World Bank	202		1,000	1,000	100.0%	
Grand Total	**47,040**		**147,912**	**106,087**	**71.7%**	**22,093**

Note: Numbers may not add to totals because of rounding.

[1] *As set out in the Administration Agreement with ESMAP donors, the current financial information relating to the three multi-donor trust funds under ESMAP management can be accessed via the World Bank's Trust Funds Donor Center secure website. The World Bank's Financial Statements, as well as the Single Audit Report on Trust Funds can be accessed via the Bank's public website for Financial Reports.*

Disbursements

ESMAP disbursed over US$38 million in FY2018, an increase of about 10% from FY2017. Disbursement for SIDS DOCK totaled approximately US$1.7 million, an increase of about 6% from the prior fiscal year. Table 9.2 presents disbursements for the two MDTFs for FY2017–18. 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 90% of disbursements, with country engagements in Africa constituting about one-third of total project disbursements. It should also be noted that the global program includes technical support by the central ESMAP unit to country/regional activities.

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

	FY2017			FY2018		
	ESMAP	**SIDS**		**ESMAP**	**SIDS**	
Region/Global Program	**$34,511**	**$1,559**	**96%**	**$38,110**	**$1,649**	**93%**
Africa	10,971	264		12,387	161	
East Asia	3,787	482		3,733	576	
Europe & Central Asia	3,025			2,926		
Latin America & the Caribbean	2,676	813		2,281	912	
Middle East & North Africa	3,128			1,435		
South Asia	2,349			2,373		
Global Program	8,575			12,975		
Program Management, KM, & Communications	**$1,281**	**$40**	**4%**	**$2,815**	**$13**	**7%**
Program Management	591	40		854	13	
Governance (CG, TAG)	129			411		
Trust Fund Administration	60			187		
Portfolio Management (Monitoring & Evaluation)	27			453		
Knowledge Management	7			258		
Communication & Outreach (publications, website, & other dissemination)	466			651		
Total	**$35,792**	**$1,599**	**100%**	**$40,925**	**$1,661**	**100%**
Of which:						
Funded by Donors	$35,392	$1,599		$40,722	$1,661	
Funded from World Bank budget	$400			$202		

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 at 24%, followed by Knowledge Hub and Renewable Energy Resource Mapping, tied at 11% each, of total disbursements. Within the ABG portfolio, disbursements in the Africa Region represented 45% of the total ABG disbursements and 11% of the total ESMAP project disbursements in FY2018.

TABLES 9.3: ESMAP, ASTAE, and SIDS DOCK Disbursements by Program Area, FY2018 (US$ thousands)

	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 Support	EE Buildings	EE City Services	Other Programs
Africa	4,367	756		713	1,657	519		593	153	2,175	243	603	603	6	
East Asia	510	236		336	2	3		3	95	1,233	391	138	255	530	
Europe & Central Asia	772	811		178			236		69			89	244	528	
Latin America & the Caribbean	1,002	174		2			2	82	233			41	207	538	
Middle East & North Africa	796	374					1				65	24	17	157	
South Asia	1,612	111		44	84	25		9		162	209		30	88	
Global Program	673	823	4,369	733	286	2,396	216	559	500	758	221	301	536	553	52
Program Management, KM & Communications															2,815
Total	**$9,732**	**$3,285**	**$4,369**	**$2,006**	**$2,029**	**$2,942**	**$455**	**$1,246**	**$1,050**	**$4,328**	**$1,129**	**$1,196**	**$1,892**	**$2,398**	**$2,867**

	TOTAL DISBURSEMENT		
	ESMAP	SIDS	Total
Africa	12,387	161	12,548
East Asia	3,733	576	4,309
Europe & Central Asia	2,926		2,926
Latin America & the Caribbean	2,281	912	3,193
Middle East & North Africa	1,435		1,435
South Asia	2,373		2,373
Global Program	12,975		12,975
Program Management, Knowledge Management & Communications	2,815	13	2,827
Total	**$40,925**	**$1,661**	**$42,586**

ABOUT ESMAP

ESMAP is a multi-donor trust fund administered by the World Bank Group (WBG), anchored in the Energy and 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 energy, 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.

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

The 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

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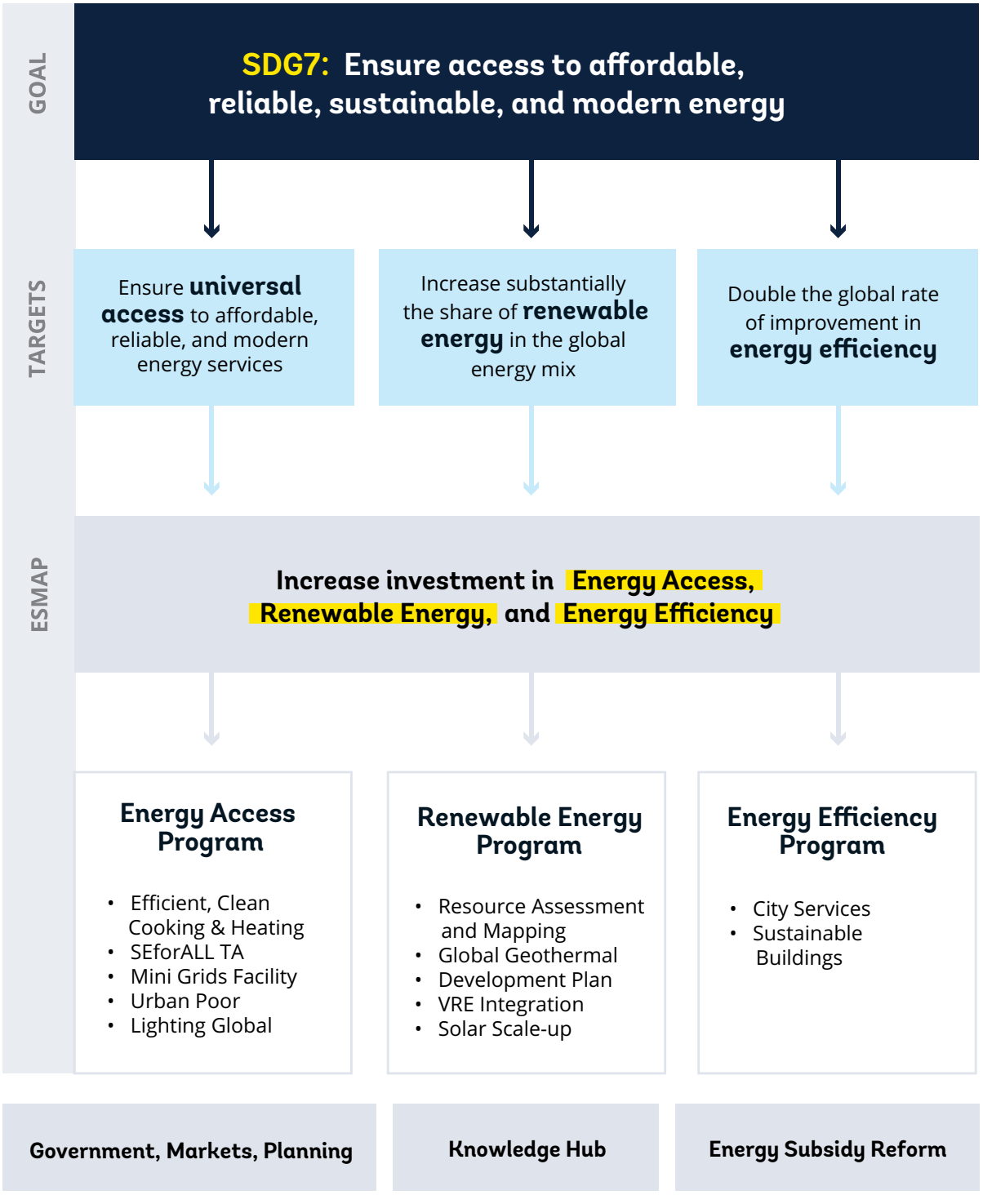
ESMAP'S THEORY OF CHANGE



ABBREVIATIONS

ABG	**Annual Block Grant**
ASTAE	**Asia Sustainable and Alternative Energy Program**
CG	Consultative Group
C-SERMS	Caribbean Sustainable Energy Roadmap and Strategy
CY	calendar year
DPF	development policy financing
ECCH	**Efficient, Clean Cooking and Heating**
EDGE	Excellence in Design for Greater Efficiencies
EE	energy efficiency
ESROC	**Energy Subsidy Reform Online Community**
FY	fiscal year
GCF	Green Climate Fund
GEF	Global Environment Facility
GGDP	**Global Geothermal Development Plan**
GHG	greenhouse gas
GOGLA	Global Off-Grid Lighting Association
GTF	**Global Tracking Framework**
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IFC	International Finance Corporation
MDTF	multi-donor trust fund
MTF	**Multi-Tier Framework**
PV	photovoltaic
RE	renewable energy
RISE	**Regulatory Indicators for Sustainable Energy**
SDG	Sustainable Development Goal
SEAR	**State of Electricity Access Report**
SEforALL	Sustainable Energy for All
SIDS	Small Island Developing States
TA	technical assistance
TAG	Technical Advisory Group
TRACE	**Tool for Rapid Assessment of City Energy**
VRE	variable renewable energy
WBG	World Bank Group

WORLD BANK REGIONS

AFR	Sub-Saharan Africa
EAP	East Asia and Pacific
ECA	Europe and Central Asia
LCR	Latin American and the Caribbean
MNA	Middle East and North Africa
SAR	South Asia

Bold *refers to ESMAP-managed initiatives or products.*
All dollar figures ($), unless otherwise specified, are in United States dollars.

ANNEX A

SUMMARY OF THE CONSULTATIVE GROUP MEETING FOR ENERGY TRUST-FUNDED PROGRAMS

APRIL 9–11, 2018

The Consultative Group (CG) meeting for the Energy Sector Management Assistance Program (ESMAP) was held in Washington, DC on April 9–11, 2018. This summary covers the discussions during the Open Sessions held on April 9 and 10, 2018.

Mr. Riccardo Puliti, Senior Director for the World Bank (WB) Energy and Extractives Global Practice (EEX), opened the event by emphasizing the vital role that ESMAP plays within the Energy Global Practice. He highlighted ESMAP's impacts on global policy and World Bank investment, as well as ESMAP's global convening power, which provides a public good to all development partners. He also stressed that the demand from World Bank clients for ESMAP's support far exceeds the resources currently available, given the scale and scope of the World Bank's country programs in the energy sector.

The CG meeting's Open Sessions, chaired by Mr. Rohit Khanna, ESMAP Program Manager, included presentations and discussions of the Technical Advisory Group (TAG) report and ESMAP activities in the thematic and cross-cutting areas. Discussion highlights for each session are provided below.

Session 1: Technical Advisory Group Report to the Consultative Group

The TAG report was introduced by Mr. John Heath, TAG member, and aimed to present a strategic view of the energy sector, highlighting ESMAP's role. He noted that off-grid options—including mini grids—and renewable energy technologies can now offer a solution to bridging the energy access gap. ESMAP's response to this changing landscape has been positive. ESMAP has scaled up support in geospatial planning, utility reform, power system planning, and electricity markets. The TAG made recommendations for further investment in the areas of power systems planning, gender, clean cooking, and solar power resources.

- **Energy Transition**. ESMAP is a key enabler of the global energy transition. ESMAP's role can be further strengthened if it focuses more on governance and market planning, considering the lack of planning in many client countries.
- **Gender**. The TAG agreed that ESMAP has come a long way in terms of incorporating gender considerations across its business plan and recommended a stronger next phase to cover gender considerations across the supply chain, extending the focus to beneficiaries and suppliers.
- **Clean Cooking and Heating**. This sector is one of the most challenging because it has multiple impacts, such as health, environment, gender, and climate. Additional donor resources are needed to scale up investments in access to clean cooking and heating. The Multi-Tier Framework (MTF) provides a comprehensive way to measure and track progress, but more focus is needed on "clean" and health impacts.
- **Solar**. Scaling up solar capacity is a key area for ESMAP, but it is currently underfunded, with many client countries expressing strong interest in assistance with policy and planning.

Session 2: The New Monitoring and Evaluation Portal

Ms. Brenda Manuel, Senior Operations Officer and lead of the ESMAP Portfolio Management team, described the features and functionalities of the new ESMAP Monitoring and Evaluation (M&E) portal, a part of the new ESMAP website. The portal makes ESMAP's portfolio data easily accessible to users who can generate customized reports

based on their information needs. Ms. Manuel demonstrated the portal to the CG, highlighting its various functions, including tracking and analysis of ESMAP activities and results.

- **Application Programming Interface**. The CG expressed interest in building the M&E portal on an application programming interface (API) to allow cross-linkages with donor organizations' databases. The ESMAP Portfolio Management team will explore the possibility of building an API, subject to clearance consistent with the World Bank's Access to Information Policy.
- **Indicators**. The CG expressed interest in connecting the ESMAP M&E portal and the World Bank corporate scorecard indicators portal. The ESMAP Portfolio Management team welcomes receiving donor-reported indicators from the CG to determine their consistency with ESMAP's own indicators, and the potential to easily capture and provide these indicators within the M&E portal.

Session 3: ESMAP Support to Middle East and North Africa

Mr. Erik Fernstrom, Practice Manager, EEX, presented a comprehensive view of ESMAP's support to the Middle East and North Africa (MNA) region. The region is going through a social and economic transition, leading to increased fragility and in some cases, conflict. At the economic level, several countries in the region face a lack of competitiveness, rising debt levels triggered by high subsidies, and an over-reliance on public sector service delivery. ESMAP enables the region to address these challenges and countries to benefit from their natural resources to pave the way for sustainable growth. For example, an ESMAP activity in Yemen is using geospatial planning to improve energy access and sustainability, despite the ongoing conflict. ESMAP also supports concentrating solar power (CSP) and the development of a national program of efficient public lighting in Morocco and geothermal exploration in Djibouti. The ESMAP Energy Subsidy Reform Facility (ESRF) is assisting the governments of Egypt and Lebanon to address the economic and social aspects of getting energy prices right. ESMAP is also supporting energy for development in the West Bank and Gaza.

- **Gender**. While ESMAP has done an excellent job of mainstreaming gender in its activities, the CG would like to see more proactivity to support female entrepreneurs, increase women's participation in the job market, and ensure that subsidy reform analyzes gender impacts.
- **Refugees and Migrants**. Countries and humanitarian organizations are requesting assistance for long-term infrastructure for refugees. Further, while utility systems are being strengthened in some countries, migrants often lack steady incomes to access services. The CG notes that ESMAP support is needed both in developing infrastructure and in increasing access to services.
- **Conflict**. The CG expressed interest in examining how to rebuild energy sector infrastructure after conflicts. To rebuild stronger sectors, ESMAP should consider solutions in refugee and migrant communities that could be replicated when refugees return to their home countries.
- **Concentrating Solar Power**. Success in CSP across the region has encouraged other countries to invest in the technology. The World Bank Noor-Ouarzazate CSP project in Morocco has created local jobs, reduced emissions, and lowered the cost of CSP technology. Knowledge sharing between countries and replication have begun and are expected to continue.

Session 4: ESMAP Support to Africa

Ms. Karen Bazex, Senior Energy Specialist, EEX; Mr. Rahul Kitchlu, Senior Energy Specialist EEX; and Ms. Ani Balabanyan, Lead Energy Specialist, EEX, discussed the World Bank's comprehensive engagement in Africa, which is focused on four goals: achieving universal access by 2030, accelerating Africa's energy transition, building operationally and financially viable utilities, and integrating regional energy systems. ESMAP has provided crucial support to Africa across all these areas.

- **Ethiopia's Electricity Sector**. ESMAP has been instrumental in supporting the country's overall sector reform. The Ethiopia Energy Sector Review and Strategy led to the development of the National Electrification Program (NEP) Implementation Roadmap for grid and off grid access. In turn, the NEP informed the preparation of the US$375 million Ethiopia Electrification Program. ESMAP is also strengthening the overall "access ecosystem" through knowledge from Regulatory Indicators for Sustainable Energy (RISE), Multi-Tier Framework (MTF) national baseline, national geographic

information system (GIS) platform, M&E system, and knowledge exchanges. In addition, it has supported the government's renewable energy Independent Power Project (IPP) Reform Program through the preparation of a wind atlas, as well as ongoing wind measurements in specific sites. These will be used to launch wind power transactions to promote private sector participation.

- **Nigeria's Power Sector Recovery Program**. ESMAP-funded diagnostic work and analytics were critical to guide the ongoing sector reform. A working group was established to prepare a Power Sector Recovery Program, aiming to restore the sector's financial viability, improve power supply to meet demand, strengthen institutional frameworks, enhance transparency and stakeholder engagement, implement policies that promote investor confidence, and establish a contract-based electricity market.
- **Regional Power Trade**. ESMAP's assistance on power pools is focusing on defining pragmatic roadmaps for World Bank support to power trade and addressing a key obstacle to regional trade, namely payment arrears for cross-border transactions in West Africa. ESMAP-supported analysis and recommendations were presented to Ministers of the West African Power Pool and are informing the preparation of various operations to help secure cross-border payments.
- **Clean Cooking**. The ESMAP team outlined its work in promoting clean cooking solutions through the ESMAP-supported Africa Clean Cooking Energy Solutions (ACCES) initiative. In Ethiopia, for example, urban areas are already using electric cookstoves due to low electricity prices, but there is a need to promote high-efficiency electric cooking devices and expand access to more populations.
- **Hydropower**. The World Bank's regional strategy supports hydropower projects, but approaches differ in each country based on least-cost investment options to diversify power supply. While ESMAP support has been limited, it funded a regional study analyzing hydropower trends in Africa.
- **Geospatial Analysis**. The CG expressed concern about the cost of geospatial analysis, which can be high when conducted on a country-by-country basis. The team responded that it is conducting sub-regional geospatial analyses in East Africa, South Africa, and West Africa.
- **Clean Energy**. The World Bank is promoting clean energy by building the capacity of regional organizations (such as ECOWAS Centre for Renewable Energy and Energy Efficiency [ECREE] in West Africa) to design programs, take ownership of program implementation, and coordinate national actors. Through the Lighting Africa and Lighting Global programs, ESMAP is supporting decentralized solar solutions in Africa.

Session 5: Renewable Energy

Mr. Oliver Knight, Senior Energy Specialist, ESMAP, presented the Renewable Energy Thematic Area, which includes four windows (Geothermal, Renewable Energy Resource Mapping, Solar Scale-Up, and Variable Renewable Energy [VRE] Grid Integration) and the Small Island Developing States trust fund (the SIDS DOCK Support Program). Over the past year, ESMAP has observed a sustained increase in demand from clients and World Bank task teams and has made considerable efforts to provide wholesale solutions that are applicable to multiple teams and clients. ESMAP foresees that many projects will span multiple windows and is planning to scale up support on solar projects to respond to and encourage diversification of the portfolio (i.e., floating and rooftop solar, and storage). A proposal to add support for on- and offshore wind was also presented. The discussion included the following key points:

- **Funding**. To continue this work at the current scale, additional funding is needed. The Renewable Energy Initiative has approved activities totaling US$13.2 million, with an additional US$5.5 million in the pipeline for FY2019/20. Assuming a similar level of demand for new activities, funding will fall short by US$8.7 million (conservative estimate). Additional funding will enable expanded support for solar power, wind power (especially offshore wind), strengthened VRE integration and power system planning, and new geospatial planning tools with global relevance.
- **Geothermal**. The CG suggested that more work is needed on geothermal heating in temperate-climate client countries. ESMAP noted that energy demand growth, confirmed geothermal resources, and a cool climate are a rare combination and there may not be adequate client demand for substantial assistance in geothermal district heating and industrial energy.

- **Global Solar Atlas and the Global Wind Atlas**. The CG was pleased to see that use of these tools is steadily increasing (the Global Solar Atlas has already reached 10,000 users per month). ESMAP anticipates updates to these tools in FY2019 to improve data quality and usability. For the Global Wind Atlas, the resolution will soon be increased to 250m from 1km. The data from both websites are increasingly used by other institutions. For instance, data has been included in the IRENA Global Atlas and integrated into country geospatial models developed by the National Renewable Energy Laboratory (NREL): https://www.re-explorer.org/.
- **Planning and Power Markets**. ESMAP sees an increased focus on planning across all regions and interest in understanding commercial and market-related constraints and barriers for increasing renewable energy penetration. For example, ESMAP's VRE Grid Integration and the Power System Planning teams have received several requests to help minimize curtailment due to both technical and commercial constraints. Going forward, ESMAP will emphasize both planning and market development.
- **Small Island Developing States.** The support program is being implemented at a relatively satisfactory rate. Projects delayed mainly due to local constraints are now picking up pace. With the second tranche of the Japanese contribution (US$6 million) supporting projects in Dominica, the Solomon Islands, and St. Lucia, the SIDS program will be fully committed. ESMAP presented detailed information on the program to the Japanese Executive Director's Office and the Danish CG member in separate meetings.
- **Energy Storage**. Increased client demand on storage is evident as ESMAP has received several proposals for support to storage related both to Solar and VRE windows. Weak regulatory environments for storage affects cost recovery in many developing countries, hampering scale-up. ESMAP or climate finance support could help improve understanding about technologies and markets to help strengthen implementation.
- **Wind Power Proposal**. ESMAP proposes additional support on wind power, noting that it lags behind solar activities in the World Bank's pipeline. Yet, onshore wind prices are comparable to solar, and offshore wind could be a viable medium-term opportunity in several countries. ESMAP proposes extending support on solar to onshore wind, and most likely a new program to support offshore wind that is modeled on the original proposal for the Global Geothermal Development Plan, to be developed in close partnership with IFC. To implement this, ESMAP needs experienced staff, stronger donor engagement, and additional funding. The CG was very supportive of the proposal, noting the strong client interest, as evident from an international training event in the Netherlands in 2017. The CG also highlighted that offshore wind can be attractive if developed in proximity to large coastal and river delta metropoles to avoid constraints in transmission and land availability. The CG emphasized that ESMAP and the World Bank should consider the Maximizing Finance for Development (MFD) approach and welcomed the suggested focus on public investments in evacuation infrastructure, preparatory studies, and integrated planning, while leaving investments in generation assets generally to the private sector. ESMAP intends to prepare a more detailed proposal for consideration by interested CG members.

Session 6: Governance, Markets, and Planning

Ms. Vivien Foster, Lead Economist, EEX, presented the Rethinking Power Sector Reform initiative that focuses on themes, such as political economy, utility restructuring and governance, regulation, cost recovery, power markets, and technology disruption. Preliminary findings highlighted a wide geographic variation in the uptake of reform pointing out significant gaps between the reforms announced and those implemented. Many World Bank client countries fall in the category of limited uptake of reform. The discussion emphasized the importance of identifying to what extent reforms had discernible impacts on power sector performance. When the technical phase of work is completed in 2018, it will provide an important opportunity for stakeholder dialogue and consensus building. A flagship report and series of policy papers are planned.

Hydropower Preparation Facility Proposal

Mr. Pravin Karki, Senior Hydropower Specialist and Global Lead, EEX, presented a proposal for creating a new Hydropower Preparation Facility under ESMAP to finance technical and analytical work on hydropower development. The proposed facility would support World Bank efforts to scale up hydropower to meet its Climate Action Plan and renewable energy targets. The examples of Nepal and Papua New Guinea were presented to show how solid upstream work and risk management

could lead to socially and environmentally responsible hydropower development. The discussion focused on the following topics:

- **Hydropower's New Role**. A CG member highlighted the untapped potential of hydropower, the importance of project preparation, and the environmental and social aspects, and encouraged CG members to support the implementation of this facility. It was also pointed out that hydropower can allow for more development of wind and solar plants.
- **Environmental and Social Standards**. The CG pointed to the importance of better designed hydropower projects and inquired whether the World Bank can play a lead role in ensuring these projects have adequate environmental and social standards. The CG also highlighted that more needs to be done in Africa and that the World Bank can move the agenda forward, building on its experience and convening power. The CG pointed out that in some countries, water scarcity may affect hydropower planning. The World Bank team confirmed that it is considering these limitations when assisting clients to develop their hydropower capacity.
- **Private and Public Investment.** CG members pointed out that there is strong interest from private parties to engage in hydropower development and that World Bank engagement builds trust and confidence for the private sector to engage in this area.

Power Systems Planning

Mr. Debabrata Chattopadhyay, Senior Energy Specialist, EEX, highlighted ESMAP's role in providing technical support to World Bank clients, regions, and project teams. ESMAP's work in this area is closely linked with Renewable Energy—especially VRE integration—and Energy Access—especially Geospatial Planning and Mini Grids. It aims to standardize support on dispatch diagnosis, least-cost analysis, climate co-benefit assessment, and transmission analysis, and to address demand in new areas such as access, country Nationally Determined Contributions (NDCs), and resilience, among others. To meet growing demand across regions, ESMAP needs to scale up and accelerate its support to about 30 additional countries. The funding gap to achieve these goals is estimated at US$1 million for 2018–20. The discussion focused on the following topics:

- **Capacity Building**. This area is an integral part of the work. For example, through training and other activities, Bangladesh has improved its institutional capacity to update its energy master plan. The CG stressed the importance of an open source model that allows country staff to be involved in the design process.
- **Integration**. The ESMAP team pointed that while there could be some overlap, VRE integration is not just grid-scale integration but also distributed integration, and covers more than planning, including utility regulation, grid codes, and market design issues. A well-coordinated program is needed between the two areas of work.
- **Nationally Determined Contributions**. The ESMAP team noted that going beyond electricity to cover other sectors in addressing targets set in country NDCs would require adding team capacity for incorporating sector-wide models.
- **Coordination with DFID's Strategic Energy Planning White Paper**. The principles and the concept of a White Paper were developed by the World Bank for further discussion with partner organizations during the SEforALL Forum in Lisbon. The ESMAP team agreed to reflect the outcomes of the discussion in the document.

Session 7: Energy Subsidy Reform Facility

Ms. Sheoli Pargal, Lead Energy Economist, ESMAP, presented the progress and achievements of the Energy Subsidy Reform Facility (ESRF). She highlighted the multifaceted approach of reforming subsidies and provided an overview of the ESRF strategy going forward. New directions include improving utility performance and repeating engagements to deepen and consolidate reform through the World Bank's policy lending and IMF programs. The discussion focused on the following issues:

- **Budget and Targets**. The CG inquired if the ESRF can use its remaining budget of US$14 million in the next two years, to which the ESMAP team noted that the current acceleration in demand is expected to help disburse the budget. The ESMAP team also noted that it will strengthen collaboration with other

ESMAP teams on cross-cutting topics, which would also stimulate demand for more comprehensive approaches to subsidy reform. Overall, the facility is on track with respect to results and commitments under the business plan. The target on policy and regulatory reforms to be achieved was increased from three countries to five. The ESMAP team considers this target to mean subsidy reductions, although policy and regulatory reforms that contribute toward a reduction of subsidies are much broader and have been implemented in many countries.

- **Smart Reform**. The CG asked to what extent the facility is pursuing "smart reforms," whereby resources freed up by subsidy reforms are redirected to transform the energy sector. The ESMAP team indicated that the ESRF is broadly embracing this approach by embedding technical assistance within broader sector reform dialogue, including strengthening utility creditworthiness, and encouraging investment in renewable energy. In Egypt, for example, successful subsidy reductions following ESMAP and World Bank support have led to a scale-up for renewable energy. In response to a CG remark on whether utility underperformance fell within the scope of the ESRF, the ESMAP team pointed out that it underlies many existing subsidies in client countries.
- **Energy Efficiency**. In response to the CG's comment on relevance of energy efficiency and subsidy reform, the ESMAP team agreed that energy efficiency is an integral part of the process, citing the example of Ukraine where a fund for energy efficiency is being set up following subsidy reform to invest in energy efficiency. However, there is often reluctance to prioritize subsidy reform as a key to addressing energy inefficiency because of the associated barriers to reform.
- **Collaboration with GSI and OECD**. Providing further details on the GSI and OECD collaboration, the ESMAP team explained that cooperation primarily focuses on knowledge exchange. There is routine dialogue with GSI and its partnership is sought in the coming year to prepare a knowledge-sharing event.

Session 8: Energy Efficiency

Ms. Martina Bosi, Senior Energy Economist and Mr. Ivan Jaques, Senior Energy Specialist, provided an overview of ESMAP's Energy Efficient Cities thematic area, which focuses on Energy Efficient City Services and Efficient and Sustainable Buildings. They highlighted the program's cross-sectoral approach and provided examples of successful engagements. For the second half of the business plan, they proposed to continue the scale-up of energy efficiency (EE) through sustainable delivery models and financing mechanisms, engage in new areas such as pilot auction models for green buildings and electric mobility, and integrate EE with other sectors' activities and objectives, such as resilience and clean cooling. The team expects that these efforts will reveal many untapped opportunities and enhance demand for ESMAP support. CG members commended the progress of this work and its cross-sectoral approach, as well as the efforts to mobilize private sector financing. The ESMAP team was encouraged to improve the results narrative around the impact of this work. The discussion focused on the following issues:

- **Budget and Prioritization**. The CG inquired about the budget surplus for the Efficient and Sustainable Buildings window to which the ESMAP team specified that the US$4 million surplus is due to the additional Swiss State Secretariat for Economic Affairs (SECO) contribution for the Kyrgyz Republic energy efficiency project and that more than 50% of the total amount has already been disbursed or allocated. The CG also asked about activity prioritization given that demand exceeds the available budget. The team prioritizes activities based on ESMAP's Business Plan and the World Bank's Climate Change Action Plan, link to operations, focus on IDA and energy transition countries, and potential for replication.
- **New Demand**. The ESMAP team noted the increased demand for urban EE, especially in Africa, where prioritizing and implementing EE has been more challenging than in other regions. A regional ESMAP activity in Botswana, Ghana, and Zambia aims to identify EE investment opportunities and establish a regional facility to strengthen capacity. The team can potentially expand to other countries and it is working with development partners to ensure complementarity.
- **Barriers and Incentives to Energy Efficiency**. The CG inquired about barriers and incentives to mainstreaming EE. The ESMAP team responded that it is working with clients on customized delivery

models and financing mechanisms and pushing for longer-term engagements to support broader client development goals. An example is Brazil, where the engagement began with two city energy diagnostics and evolved into an array of analytical work that led to financing mechanisms to increase private sector investments in energy efficiency in public lighting and industry.

- **Collaboration with Other Global Practices**. The ESMAP team indicated that it evaluates World Bank Global Practice (GP) priorities and objectives before proposing ways to mainstream EE. In Transport, for example, EE is one of the key action areas to reducing greenhouse gas emissions and local air pollution. **Electric mobility** has the potential to transform transport and energy systems and the ESMAP team plans to do more to help countries create the right enabling environment. The **Cooling agenda** is also a key area for collaboration; in fact, the Efficient and Sustainable Buildings initiative, which is set up to also cover appliances, proposes to partner with the World Bank's Montreal Protocol team to advance work in this area.

Session 9: Knowledge Hub, including GTF, MTF, RISE, & SEAR

Ms. Elisa Portale, Senior Energy Specialist, ESMAP, presented four knowledge products developed to track the sustainable development goal on energy (SDG7)—**Tracking SDG7: The Energy Progress Report** (formerly known as the **Global Tracking Framework**), the **Multi-Tier Framework (MTF)**, the **Regulatory Indicators for Sustainable Energy (RISE)**, and the **State of Energy Access Report (SEAR)—**highlighting their interconnection and the complementarity. The CG noted that this work is very valuable and expressed interest in strengthening the connection among these products. The ESMAP team and CG members agreed on a more robust effort to communicate findings, to strengthen ESMAP's visibility as the coordinating mechanism for these products, to explore coordination of indicators through the MTF, and to mobilize stakeholders for more investment in clean cooking. Specific points raised include

- **Impact of this Knowledge**. The CG praised the work completed and asked for examples of country-specific impacts. The ESMAP team shared the cases of Rwanda and Cambodia where MTF findings are already impacting national planning. Rwanda accepted the MTF module into its national survey, which will help sustain a longer-term effort to track progress.
- **Clean Cooking**. The CG expressed an interest in more data on clean cooking. The ESMAP team stressed that the MTF provides detailed data on cooking and impacts, never available before. The team has also been in dialogue with GACC, Endev/GIZ, and WHO to help develop a framework to better capture the health implications of using lower-tier cookstoves. Unfortunately, not all countries see this as a priority and both the CG and ESMAP agreed that there should be more effort to strengthen client interest.
- **Updating State of Energy Access Report**. The CG raised concerns about the future SEAR and the use of its findings. The ESMAP team mentioned that the qualitative nature of SEAR's content determines the frequency of the report and assured the CG that SEAR has been quoted and referenced in impact evaluations, case studies, and elsewhere. The MTF provides grid and off grid data and could be used to complement SEAR. CG suggested producing another edition of SEAR focusing on clean cooking.

Session 10: Energy Access

ESMAP Senior Energy Specialists Ms. Dana Rysankova, Mr. Jon Exel, and Ms. Yabei Zhang, and Energy Specialist Ms. Rutu Dave updated the CG on the Energy Access thematic area, which includes the Efficient and Clean Cooking and Heating (ECCH) initiative, as well as a comprehensive approach to accelerate electrification through the SEforALL Technical Assistance Program, Global Mini Grid Facility, Lighting Global, and Urban Poor initiative. The discussion focused on the following issues:

- **Increased Importance of Energy Access**. With the recent call for proposals and collaborators across GPs such as Health, Environment, and Agriculture, demand for ESMAP support has increased significantly. Demand is especially high for geospatial planning tools, Lighting Global, and Mini Grids. The Urban Poor initiative is also picking up momentum while ECCH is strengthening crucial internal partnerships across sectors and with external stakeholders. Demand on electricity access

is large in Sub-Saharan Africa where the World Bank is supporting a multibillion-dollar effort to help countries design projects. ESMAP is building team capacity to meet this demand but more resources may be needed.

- **Electric Cooking and Mini Grids**. Household affordability was discussed. The examples of Ethiopia, the Kyrgyz Republic, and Tajikistan show that low electricity prices are incentives to use more electricity for cooking. In many African countries, where prices are high, electric cookstoves are less of an option for poor households. The ESMAP team will explore the option of using mini grids to provide affordable electricity for cooking.
- **Results-Based Financing**. The ESMAP team is collaborating with the World Bank health team on using the averted disability adjusted life years (ADALYs) as an indicator to measure the health impacts that can lay a foundation for a results-based financing (RBF) mechanism that incentivizes health, gender, and climate co-benefits.
- **Urban Poor**. ESMAP's experience in providing safe, legal, and affordable electricity connections for urban slum populations can be replicated for the forcibly displaced and refugee host communities in urban and peri-urban areas. Kenya, for example, wanted to offer solutions to host communities but lacked the tools to target beneficiaries. Therefore, a partnership with the UN Refugee Agency (UNHCR) has been initiated to tackle this type of data challenge and benefit host country projects by providing access to UNHCR's data and on-the-ground expertise.
- **Mini Grids**. The discussion focused on operators and project developers, which include (i) local operators (small to medium businesses), (ii) intermediaries (international specialized developers), and (iii) large global corporations that are moving from high-income countries to low-income countries. The ESMAP team is conducting a benchmark study to track the costing of mini grids including the individual components. The team has also initiated discussions with several partners to bring the overall mini grid development costs down. One way to reduce cost is by inviting developers to submit business plans requesting minimum subsidy levels.
- **Donor Coordination at the Country Level**. The CG pointed out that ESMAP should further strengthen coordination of World Bank/ESMAP activities with donors at the country level. The ESMAP team agreed and noted that is has been promoting this type of coordination by organizing learning events (for example, the latest mini grid event in Nigeria) that provide an opportunity for all partners to discuss and coordinate. In Kenya, the ESMAP team is expanding relevant working groups for better coordination. The World Bank is also part of the Energy Africa dialogue, where most countries are part of donor working groups, and it is also collaborating with the Alliance for the Sahel, initiated by France.

Session 11: Gender and Energy

Ms. Vanessa Lopes Janik, Operations Officer, ESMAP, presented the progress of the Gender and Energy work, highlighting its impact on World Bank projects. She also focused on how it strengthened knowledge and established linkages with other ESMAP areas such as geothermal, energy efficiency, and clean cooking initiatives. CG members were pleased with the accomplishments of the work on gender and expressed interest in exploring new areas such as women in science, technology, engineering, and math (STEM); energy workforce; childcare; etc. They also noted that ESMAP should continue to play a key role globally in this area. Topics raised include

- **Practical Experiences in World Bank Projects**. The CG commended the experience in Africa and East Asia and the Pacific and the new regional gender and energy programs. ESMAP has helped develop a strong repository of best practices and practical experiences, as well as a roster of global gender experts. To meet the World Bank corporate goals on gender equality, demand continues for ESMAP support not only during project design but also throughout implementation and completion. The ESMAP team follows a learn-by-doing approach to help cope with large demand and is working closely with Social and Gender units across the World Bank. The CG was keen to learn more about how gender can be incorporated in the transport sector. The ESMAP team highlighted a project in Brazil to show the impact of improved street lighting on women.

- **Partnerships and Knowledge**. The CG wanted to learn more about strengthening partnerships. The ESMAP team responded that it has strengthened its outreach through knowledge-sharing events, the new People's Centered Accelerator, and a new work stream on data. ESMAP closely collaborates with ENERGIA, UN Women, USAID, IUCN, ECOWAS-ECREE, and many others. An e-course on Gender and Energy was converted to a self-paced course that also offers niche modules within the gender sphere. A Technical Report, *Getting to Gender Equality in Electricity Infrastructure,* was also recently published and disseminated.
- **Gender Inclusion, Women in the Workforce, and Childcare**. The CG was keen on exploring these new areas. In Morocco, a World Bank project promoted gender inclusion in STEM fields and as a result, additional financing is now ensuring female engineers are included in the projects and the energy sector. In terms of childcare, some initial work is being done regarding working with utilities to improve working conditions for women and families, for example, in Ethiopia and Vietnam.
- **Women and Off-Grid Solar Energy**. The CG raised a question about increasing women's access to and participation in the off-grid solar sector. The ESMAP team responded that while more work needs to be done in this area, there are successful examples. In Gaza, a World Bank project ensures women have better access to solar energy and business training and it provides support to small and medium enterprises. In Haiti, a World Bank project provides financing to the private sector to ensure female participation in the supply chain of new off-grid projects.

Session 12: Communications Strategy and Knowledge Management Action Plan

Ms. Nansia Constantinou, Communications Officer, ESMAP, provided an update on the communications work. She presented how the team responded to the CG's requests from the previous year to strengthen ESMAP's brand, communicate results, and establish linkages with partners/influencers on media and social platforms. She also highlighted the successful launch of the new ESMAP website, which grew online audiences by almost 150%, and ESMAP's new interactive Annual Report promoted on online channels, which generated almost 60,000 pageviews. Following her presentation, Ms. Heather Austin, Publishing Associate/Knowledge Management Coordinator, ESMAP, summarized the progress in implementing ESMAP's knowledge management strategy. This includes the creation of targeted knowledge products based on audience needs and a revamped branding and publications strategy. The CG commented on the progress of this work, noting a stronger visibility for ESMAP in several global events. Specific issues raised include

- **Coordination with Donor Communications Teams**. Per the CG's suggestion to strengthen coordination with donor communications teams, the ESMAP team agreed to develop a plan and align outreach. It will also flag relevant content to donors and relevant partners through a targeted strategy based on stakeholder mapping.
- **Social Media**. The CG suggested highlighting cooperation with donors and partners on social media to help strengthen the conversation. The ESMAP team noted that it ran multiple social media campaigns, which included hashtags of donors and partners, but agreed to strengthen these references in the future.
- **Website**. The CG noted that the donor countries were not among the top visitors to ESMAP's website. The ESMAP team responded that messages were targeted to audiences that are more likely to be from developing countries. The team also mentioned that selected content is also made available in other languages to reach country-specific audiences. The average time spent on the website was discussed based on metrics about energydata.info. The ESMAP team noted longer times are not necessarily an indicator of a successful site as users may visit a site for very specific information (i.e., downloading a report). CG members suggested using energypedia.com to link ESMAP content with specific countries or regions. Another suggestion was to produce a brief overview video on ESMAP's mission to which the ESMAP team noted that it was already in production.

ANNEX B

RESULTS AND TARGETS ACHIEVED FOR FY2017–20 BUSINESS PLAN

Regions:
AFR = Africa
EAP = East Asia and Pacific
ECA = Europe and Central Asia
LAC = Latin America and the Caribbean
MNA = Middle East and North Africa
SAR = South Asia Region

TARGETS FOR FY2017–20 BUSINESS PLAN	RESULTS ACHIEVED FY2017–18
ANNUAL BLOCK GRANTS FOR GOVERNANCE, MARKETS AND PLANNING	
10 countries confirm using the results of ESMAP-supported energy sector assessments in policy decisions	**6 out of 10** 1) Bangladesh — support to the Government, the regulator, and system operator on the requirements for transition to a market regime that will enable Bangladesh to participate in a power market; 2) Jordan — Recommendations to National Electric Power Company's (NEPCO's) management and board of directors lead to NEPCO's board approving an organizational restructuring; 3) Kenya — Energy Regulatory Commission (ERC), regulations have been analyzed and recommendations for amendments made; 4) Madagascar — Standard Power Purchase Agreements (PPAs) and Standard Concession Agreements (CAs), and Safeguard frameworks for small hydro IPPs have been prepared, expected to inform the Government on competitive processes for the development of small hydro with private sector investments. 5) Serbia — first systematic assessment of the natural gas sector in Serbia, including developing draft reform measures for addressing the financial distress and unstainable debt of the natural gas utility and by developing methodology for investment assessment; and 6) Vietnam — Develop for Vietnam Electricity Utility (EVN) a comprehensive strategy for unbundling and divesting its generation assets, including a timeline for the launch of IPO/strategic investor transactions;
Preparation of 10 new investment and TA lending operations, 10 existing operations informed; mobilization of private sector investment and other non-bank resources facilitated in 10 countries	35 operations informed *(exceeded the target)* Mobilization of co-financing or other financiers in 5 out of 10 countries

Clients in 20 countries confirm enhanced institutional capacity to improve the performance of the power sector	**16 out of 20** Ghana, Haiti, Jordan, Kenya, Liberia, Moldova, Nepal, Niger, Nigeria, Uzbekistan, and the Greater Mekong Sub-Region (Vietnam, Thailand, Lao PDR, China, Cambodia, Myanmar)
5 countries provided with technical assistance for project implementation	**4 out of 5** 1) Water, Electricity and Urban Development Project (PEEDU - P106975); 2) Kenya Off-grid Solar Access Project for Underserved Countries (P160009); 3) Ghana Energy Sector Transformation Initiative Project (P163984); and 4) Myanmar: National Electrification Project (P152936);

ENERGY ACCESS | EFFICIENT CLEAN COOKING AND HEATING

4 cooking heating country program operations or activities developed in the lending portfolio, of which 2 with an explicit approach for improved equity of male and female participation across the value chain	**3 out of 4** 1) Kenya Off Grid Solar Access Project (P160009) 2) Kyrgyzstan Heat Supply Improvement Project (P157079) 3) Bangladesh RERED II cooking component (P165400)
2 countries or programs with new or updated enabling and regulatory frameworks	**3 out of 2 *(exceeded the target)*** 1) The East African Community Customs Union approved reduction of import duty rate from 25% to 10% for appliance for solid fuel (Legal Notice No. EAC/32/2016). 2) Hebei province of China adopted the updated stoves emission standard and testing protocol and the results-based incentive mechanism in its stove promotion program. 3) Indonesia national standard body has upgraded its national standard for cookstoves to adopt the Indonesia Clean Stove Initiative-Water Heating Test (CSI-WHT).
4 enterprises that are "new entrants" in a specific country or market segment for clean cooking and heating	**21 out of 4 *(exceeded the target)*** 10 new enterprises in Indonesia and 11 in Uganda

ENERGY ACCESS | GLOBAL FACILITY ON MINI GRIDS

3 new World Bank operations informed	**5 out of 3 *(exceeded the target)*** 1) Niger Solar Electricity Access Project (P160170) 2) Haiti Renewable Energy for All (P156719) 3) Haiti Modern Energy Services for All (P154351) 4) Kenya Off-Grid Solar Access Project (K-OSAP) (P160009) 5) Nigeria Electrification Project (NEP) (P161885)
US$50 million of concessional funds mobilized	**US$253.1M out of US$50M *(exceeded the target)*** • Haiti: US$3M IDA Investments • Haiti: US$25.1M IDA Investments • Kenya: US$40M IDA Investments

	• Niger: US$35M IDA Investments • Nigeria: US$150M IDA Investments
5 countries supported for project identification and preparation	**6 out of 5** ***(exceeded the target)*** 1) Haiti Renewable Energy for All (P156719); 2) Haiti Modern Energy Services for All (P154351); 3) Kenya: Off-grid Solar Access Project for Underserved Counties (P160009); 4) Nepal Private Sector-Led Mini-Grid Energy Access Project (P149239); 5) Niger Solar Electricity Access Project (P160170); and 6) Nigeria Electrification Project (P151885)
5 countries provided with technical assistance for project implementation	**6 out of 5** 1) Ghana: Additional Financing for Energy Development and Access Project (P147878); 2) Liberia Renewable Energy Access (P149683); 3) Mali Rural Electrification Hybrid System Project (P131084); 4) Myanmar: National Electrification Project (P152936); 5) Rwanda Renewable Energy Fund (P160699); and 6) Tanzania Energy Development & Access Expansion Project (P101645)

ENERGY ACCESS | LIGHTING GLOBAL

At least 8 World Bank projects with solar off-grid components supporting growth of sustainable markets, mobilizing private sector funding	**8 out of 8** Lighting Africa/Lighting Global-supported projects with sizeable off-grid components were approved in FY2018, including: 1) Niger Solar Electricity Access Project (P160170) 2) Rwanda Renewable Energy Fund Project (P160699) 3) Zambia Electricity Service Access Project (P162760) 4) Kenya Off Grid Solar Access Project (P160009) 5) Haiti Modern Energy Services for All (P156719) 6) Haiti Renewable Energy for All Project (P154351) 7) Pakistan Sindh Solar Energy Project (P159712) 8) Nigeria Electrification Project (P161885)

ENERGY ACCESS | URBAN POOR ELECTRICITY ACCESS PROGRAM

2 World Bank energy access projects supported	**3 out of 2** ***(exceeded the target)*** 1) Argentina Metropolitan Buenos Aires Urban Transformation Project (P159843) 2) Yemen Integrated Urban Services Emergency Project (P164190) 3) Yemen Emergency Electricity Access Project (P163777)
2 projects with expanded scope of beneficiaries	**3 out of 2** ***(exceeded the target)*** 1) Democratic Republic of Congo: Rehabilitation of Distribution Grids 2) Dominican Republic: Distribution Grid Modernization and Loss Reduction

	3) Yemen: Support to Recovery of Electricity Services in Yemen: Emergency Electricity Access Project and Power Sector Recovery and Reconstruction Program
2 South-South exchanges conducted	**1 out of 2** Kenya Electricity Expansion Project (P153179) brought together utility experts from Rio Light, EPM, and Eskom

ENERGY ACCESS | SEforALL TECHNICAL ASSISTANCE

5 countries have been supported in the definition and implementation of energy sector-wide approaches and tools	**5 of 5** Kenya, Madagascar, Malawi, Mozambique, and Zambia
At least 4 existing geospatial plans improved	**2 out of 4** Support provided for update of Kenya and Myanmar geospatial electrification plans

ENERGY EFFICIENCY | ENERGY EFFICIENT CITY SERVICES

At least 8 World Bank Group operations informed	**15 out of 8 *(exceeded the target)*** *15 operations informed by grants:* **Existing:** 1. Albania: Project for Integrated Urban and Tourism Development (PIUTD) (P155875) – approved by the Board in FY17 2. Argentina Metropolitan Buenos Aires Urban Transformation Project (P159843) – approved by the Board in FY17 3. Kazakhstan Energy Efficiency Project (P130013) – approved by the Board in FY13 4. Ukraine District Heating Energy Efficiency Project (P132741) – approved by the Board in FY14 5. Uzbekistan Bukhara and Samarkand Sewerage Project (P112719) – approved by the Board in FY10 6. Uzbekistan Syrdarya Water Supply Project (P111760) – approved by the Board in FY11 7. Uzbekistan Alat and Karakul Water Supply Project (P118197) – approved by the Board in FY13 8. Vietnam Energy Efficiency for Industrial Enterprises Project (P151086) – approved by the Board in FY17 **New (approved by the Board in FY18)**: 1. Brazil FinBRAZEEC: Financial Instruments for Brazil Energy Efficient Cities (P162455) 2. China Liaoning Safe and Sustainable Urban Water Supply project (P158713) 3. Côte d'Ivoire Greater Abidjan Port – City Integration Project (P159697) 4. India Energy Efficiency Scale-up Program (P162849) 5. Kyrgyz Heat Supply Improvement Project (P157079) 6. Lebanon Greater Beirut Public Transport Project (P160224) 7. Uzbekistan District Heating Energy Efficiency Project (P146206)

Support at least 30 cities/regions/countries with technical assistance on energy efficient city services At least 20 city plans or projects informed	**34 out of 30 *(exceeded target)*** ESMAP is providing technical assistance for energy efficiency city plans or projects in 34 cities/regions/countries, including: • FY17: Argentina (Buenos Aires), China (Anshan, Fushun, Fuxin, Gaizhou, Metropolitan Shanghai, Shenyang), Kazakhstan (Almaty, Astana), Panama, Mongolia (Ulaanbaatar), Ukraine (Chernihiv, Dnipro, Kamianets-Podilsky, Kherson, Kharkiv, Mykolaiv, Odessa, Ternopil) • FY18: Botswana, Brazil, India (Kolkata, Shimla and nationwide), Egypt (Cairo), Georgia (Tbilisi), Ghana, Indonesia, Morocco, Serbia (Belgrade), Uzbekistan (Namangan and nationwide), Vietnam, and Zambia.

ENERGY EFFICIENCY | EFFICIENT AND SUSTAINABLE BUILDINGS[1]

At least 10 buildings-related World Bank Group operations include sustainable energy components	**10 out of 10** 1) Argentina: Metropolitan Buenos Aires Urban Transformation (P159843) 2) India: EE Scale-Up Program (P162849) 3) Côte d'Ivoire: Affordable Housing Finance (P161658) 4) Côte d'Ivoire: Greater Abidjan Project (P159697) 5) Kazakhstan: EE Project (P130013) 6) Kyrgyzstan: Heat Supply Improvement Project (P157079) 7) Montenegro: Second EE Project (P165509) 8) Brazil: Financial Instruments for Brazil Energy Efficient Cities (P162455) 9) Marshall Islands: Sustainable Energy Development Project (P160910) 10) Mexico PRESEM Additional Finance for Energy Efficiency in Public Buildings (P165585)
At least 7 country building-related policies/plans/strategies informed	**4 out of 7** 1) Kazakhstan: City government adopts recommended EE financing mechanism (Almaty and Astana) 2) Panama: Building codes and green labeling standards 3) Vietnam: Mandatory EE policy adopted and to be approved by the Prime Minister's Office 4) Western Balkans: Bosnia, Kosovo, and Montenegro have detailed proposals to establish EE Funds or revolving financing schemes
7 knowledge products developed and disseminated to World Bank Group staff, clients, and global fora	**5 out of 7** 1) Report on Assessing and Measuring the Performance of EE Projects 2) Study on Using the Climate Auction Model to Catalyze Energy and Resource Efficient Buildings

[1] The indicators and targets of the results framework have been updated to (i) be consistent with the revised ESMAP business plan and (ii) reflect progress and achievements to date. The following changes were made during FY18: (a) Increase of target for informed operations from five to 10; (b) Increase of target for knowledge products from three to seven; and (c) Increase of target for knowledge exchanges from two to three.

	3) *Live Wire*: Exploiting Synergies between Rooftop Solar PV and Energy Efficiency in the Built Environment 4) *Live Wire*: Financing EE: Revolving Funds 5) *Live Wire*, 3 issues: EE in the Public Sector, Residential EE, and EE in Industry
3 knowledge exchanges supported or organized	**2 out of 3** 1) First knowledge exchange event on Energy Efficient Buildings and Neighborhoods in Côte d'Ivoire (with GABC and ADEME) 2) Sustainable financing knowledge event organized between Armenia and Montenegro

ENERGY SUBSIDY REFORM AND DELIVERY TECHNICAL ASSISTANCE FACILITY

Policy and/or regulatory reforms on energy subsidies and pricing reforms applied by at least 5 client countries[2]	**6 out of 5 (exceeded the target)** 1) Algeria — Government to prepare the progressive elimination of subsidies and design of a targeted cash transfer program, based on Bank recommendations; 2) Iraq — power subsidies for the non-poor were removed; 3) Madagascar — fuel subsidy eliminated in June 2017; 4) Rwanda's regulator implemented new electricity tariffs effective August 13, 2018, which raise the average cost recovery level, introduce new tariff categories, rationalize tariffs for selected consumers, and include quarterly "automatic tariff adjustment;" 5) Serbia — increase in electricity tariffs between 2015–17 accompanied by an expansion of coverage under the Government's Energy Vulnerable Customer Program; and 6) Tunisia — first round of electricity and gas tariff adjustments enacted with the target of moving energy subsidies from 1.8% of GDP in 2017 to 1.5% of GDP in 2019
Diagnostic reports in at least 5 countries per year[3]	**43 out of 5 reports/fiscal year (exceeded target)**: 37 completed and 6 draft reports covering 18 countries (and one in MENA as a regional activity) completed.
At least 5 Bank lending operations informed over the business plan period[4]	**10 out of 5 over business plan period *(exceeded target)*:** 1) Iraq: Second Expenditure Rationalization, Energy Efficiency and State-Owned Enterprise Governance Programmatic Development Policy Financing DPF (P161167) 2) Jordan: Second Programmatic Energy and Water Sector Reforms Development Policy Loan DPL (P160236)

[2] Original indicator/target: Policy and/or regulatory reforms on energy subsidies and pricing reforms applied by at least 3 client countries. Revision took place in FY18: The original target has been updated to take into account good progress and achievements to date.

[3] Original indicator/target: Country diagnostic in 10 countries. Revision took place in FY18: The original target has been updated to take into account good progress and achievements to date.

[4] Original indicator/target: Country demand for further TA and/or implementation of reform following 30% of diagnostic assessments. Revision took place in FY18: The original indicator has been dropped because demand does not follow linearly and could come about years later.

	3) Myanmar: First Macroeconomic Stability and Fiscal Resilience DPO (P152734) 4) Egypt: Second Fiscal Consolidation, Sustainable Energy and Competitiveness DPF (P161228) 5) Serbia: First Public Expenditure and Utilities Development Policy DPL1 Loan (P155694) 6) Madagascar: Public Finance Sustainability and Investment Development Policy Financing Operation (P160866) 7) Tunisia: investment, competitiveness and inclusion DPL (P161483) 8) Egypt: Third Fiscal Consolidation, Sustainable Energy, and Competitiveness Programmatic Development Policy Financing (P164079) 9) Madagascar: Public Finance sustainability and Investment DPF II (P164137) 10) Jordan: First Equitable Growth and Job Creation Programmatic DPF (P166360)
Knowledge Exchange/Events/Outreach, including: – 10 events produced per year (including BBLs, ESROC webinars); – 300 members on platform by the end of period; and – 3 known collaborations between countries (knowledge exchange that is not an ESROC webinar) over the period.	• World Bank Energy Week showcase • 9 BBLs • 6 ESROC • 255 ESROC members on platform • ***Country briefs*** prepared that cover efforts at subsidy reform in Madagascar, Kyrgyz Republic, and Serbia • ***Energy Subsidy Reform Assessment Framework*** completed (9 modules addressing different aspects of energy subsidy reform) • COP23 Side Event in Bonn: Energy Subsidy Reform: A comprehensive approach (Panel discussion with Mexico, Indonesia, Ukraine, Jordan, Morocco, and the IMF) iCoP Newsletter launched – 7 issues circulated and published

RENEWABLE ENERGY | GLOBAL GEOTHERMAL DEVELOPMENT PLAN

3 new World Bank operations informed	**3 out of 3** 1) Chile: Technical Assistance for Geothermal Development Project (P152820) 2) Indonesia: Geothermal Energy Upstream Development (P161644) 3) Turkey: Geothermal Development Project (P151739)
New round of concessional funds mobilization	Green Climate Fund support for Indonesia under consideration
Needs assessment in 3 countries	**0 out of 3** Consultants have been engaged to define best practices in geothermal exploration data management. Needs assessments will be based on the findings of the consultants.

RENEWABLE ENERGY | RENEWABLE ENERGY RESOURCE MAPPING

>5 WBG operations informed[5]	**3 out of 5** 1) Pakistan: Sindh Solar Energy Project (P159712) 2) Zambia: Scaling Solar Energy Guarantee Project (P163958) 3) Zambia: Second Scaling Solar Guarantee (P157943)
>5 non-ESMAP funded solar/wind measurement projects adopt ESMAP-developed standards/guidelines	**5 out of 5:** 1) Armenia: Utility Scale Solar Power Project (P163316) 2) Malawi Energy Sector Project (P099626) 3) Madagascar: IFC Scaling Solar 4) Senegal: IFC Scaling Solar 5) Zambia: IFC Scaling Solar
>15,000 monthly users on the Global Solar Atlas by end of FY19	**9,600 out of 15,000:** Average of 9,600 users per month
>10,000 monthly users on the Global Wind Atlas by end of FY19	**4,700 out of 10,000:** Average of 4,700 users per month

RENEWABLE ENERGY | SOLAR SCALE-UP PROGRAM

>10 WBG operations or external projects informed[6]	**7 out of 10** 1) Ethiopia: Ethiopia Electrification Program (ELEAP) (P160395) 2) Haiti: Modern Energy Services for All (P154351) 3) Haiti: Renewable Energy for All (P156719) 4) India: Shared Infrastructure for Solar Parks (P154283) 5) Kenya: Off-Grid Solar Access Project for Underserved Counties (P160009) 6) Mongolia: Second Energy Sector Project (P152343) 7) Pakistan: Sindh Solar Energy Project (P159712)
>12 country planning strategies or country policies informed	**2 out of 12** 1) Vietnam: Government decision to pilot a solar auction with WB assistance 2) Turkey: inputs to regulatory frameworks for rooftop solar development

5 Original Indicators/Targets: >US$15m in additional funding leveraged, >5 external projects informed/support, >12 countries apply innovative geospatial, GIS, open data and analytics to decision GIS, open data and analytics to decision-making. Revision took place in FY18. Rationale for the revision: As a result of the new focus on the Global Solar Atlas (GSA) and Global Wind Atlas (GWA), corporate pressures to shift solar and wind measurement campaigns to client execution, and a proposed shift of resources from the RE Mapping to the Solar window, the original targets are no longer relevant. The revised indicators and targets reflect ESMAP's aim to disseminate the methodology and lessons learned on solar/wind measurement campaigns rather than raise additional funding and support solar/wind scale-up and consolidation of efforts through the GSA/ GWA. Meanwhile, we believe several WBG operational projects will directly use the outputs from the original set of countries, so that target has been revised.

6 Original Indicators/Targets: >5 new World Bank operations informed, >2 external projects informed/ supported, >7 country planning strategies informed, >5 country policies informed. Revision took place in FY18. Rationale for the revision: The original targets have been consolidated and updated to take into account good progress and achievements to date and focus of the program on support to full-fledged Bank operations and not only country planning strategies or policies.

RENEWABLE ENERGY | VARIABLE RENEWABLE ENERGY GRID INTEGRATION SUPPORT PROGRAM[7]

At least 8 new World Bank operations informed	**9 out of 8 *(exceeded the target)*** 1) Ethiopia Electrification Program (P160395) 2) Gambia Electricity Restoration and Modernization Project (P163568) 3) Haiti Renewable Energy for All (P156719) 4) Haiti Modern Energy Services for All (P154351) 5) India Share infrastructure for Solar Parks (P154283) 6) Kenya Off-Grid Solar Access Project for Underserved Countries(P160009) 7) Mongolia Second Energy Sector Project (P152343) 8) Morocco Noor Solar Power Project Additional Financing (P164288) 9) Togo Energy Sector Support and Investment Project (P160377)
At least 10 country planning strategies or policies informed	**8 out of 10** 1) Costa Rica: Scaling Up Distributed Generation with Roof-top Solar PV 2) Guatemala: Guatemala Wind and Solar Integration Study 3) Haiti: Haiti Solar and VRE Grid Integration 4) India: Solar Parks — Grid Integration Study and Capacity Building 5) Mongolia: Renewable Energy Integration for Mongolia's Western Energy System 6) Sri Lanka: Capacity Building for Planning and VRE Grid Integration 7) Uzbekistan: Power System Planning Study 8) Vietnam: Accommodating the 20 GW Variable Renewable Energy Target for 2030 in Vietnam Power System

SEFORALL KNOWLEDGE HUB

RISE 2017, RISE 2018, RISE 2020	**RISE 2017**: http://rise.esmap.org/
GTF 2017, GTF 2018, GTF 2019, GTF 2020	**GTF 2017**: https://trackingsdg7.esmap.org/
MTF 2018 and MTF 2020	Cambodia, Ethiopia, Rwanda
SEAR 2017 and SEAR 2019	**SEAR 2017**: http://esmap.org/sear/

[7] Original targets were: (a) at least 5 new World Bank operations informed; (b) at least 2 external projects informed/ supported; (c) least 7 country planning strategies informed; and (d) least 5 country policies informed. Targets (c) and (d) have been combied to "at least 10 country planning strategies or policies informed."

ANNEX C

COMPLETED, NEW, AND ONGOING ACTIVITIES, FY2018

Note: Activities may be receiving funding from multiple Thematic Areas.

EA = Energy Access
EE = Energy Efficiency
GMP = Governance, Markets & Planning
O = Other
RE = Renewable Energy
SEforALL Knowledge Hub = Sustainable Energy for All
SR = Subsidy Reform

Regions:

AFR = Africa
EAP = East Asia and Pacific
ECA = Europe and Central Asia
LAC = Latin America and the Caribbean
MNA = Middle East and North Africa
SAR = South Asia Region

Table C.1 | ESMAP Completed Activities, FY2018

COUNTRY/ REGION	COMPLETED ACTIVITY	PRIORITY (if applicable)
ENERGY ACCESS		
AFR	AFREA II: Africa Electrification Initiative [GMP]	Green Mini Grids
Indonesia	Supervision and Preparation of Scale-Up of Indonesia CSI Pilot	Efficient, Clean Cooking & Heating
LAC	Central America Clean Cooking Initiative (CACCI)	Efficient, Clean Cooking & Heating
ENERGY EFFICIENCY		
Albania	Albania: Project for Integrated Urban and Tourism Development	Energy Efficient City Services
China	Energy Saving Management Action Plan for Water Utilities in Liaoning	Energy Efficient City Services
Egypt, Arab Republic of	Towards Energy Efficiency Implementation in Cities in Egypt	Energy Efficient City Services
Global	Capacity Building for Leaders in Energy Efficient Urban Transport Planning – 2	Energy Efficient City Services
Global	EDGE Green Building Market Transformation Program	Energy Efficient Buildings
LAC	Brazil Energy Efficient Cities Program	Energy Efficient City Services
Philippines	Philippines: Improving Energy Efficiency in Public Buildings	Energy Efficient Buildings
GOVERNANCE, MARKETS & PLANNING		
AFR	AFREA II: Africa Electrification Initiative	
AFR	Increased Electricity Access Support Program	
AFR	Role of Subsidies: Financing Electricity Supply and Providing Affordable Access in Sub-Saharan Africa	
Algeria	Algeria Vision 2035: Energy Efficiency	
Belarus	Belarus: End User Heat Control and Cost Allocation Project	
Belize	Energy Resilience for Climate Adapt	

Columbia	Support to Conference: "Dialogues on the Future of Energy 2017"	
Georgia	Analytical Support for Assessment of Contingent Liabilities	
LAC	Energy Markets: Challenges and Opportunities, Phase II	
MNA	Benchmarking Electricity Utilities Performance in the MNA Region	
Serbia	Serbia Natural Gas Sector Analysis	
Serbia	Serbia Power System Study	
Turkey	Turkey Rooftop Solar Photovoltaic Market Assessment	
RENEWABLE ENERGY		
Kenya	Kenya Geothermal Strategy	Global Geothermal Development Plan
LAC	Energy Markets: Challenges and Opportunities – Phase II GMP	Integrating Variable Renewables
Mongolia	Renewable Energy Integration for Mongolia's Western Energy System (RE4WES)	Integrating Variable Renewables
Serbia	Serbia Natural Gas Sector Analysis GMP	Global Geothermal Development Plan
Serbia	Serbia Power System Study GMP	Integrating Variable Renewables
Turkey	Turkey Rooftop Solar Photovoltaic Market Assessment GMP	Solar Scale-Up Program
SUBSIDY REFORM		
Ukraine	Ukraine: Advancing Energy Tariff and Subsidy Reforms	

Table C.2 | ESMAP New Activities, FY2018

COUNTRY/ REGION	NEW ACTIVITY	PRIORITY (if applicable)
ENERGY ACCESS		
AFR	Africa Regional Geospatial Planning Support	SEforALL TA
AFR	Integrating Bio-digesters for Cooking into Small Farm Activities	Efficient, Clean Cooking & Heating
Bangladesh	Increasing the Sustainability and Efficiency of Fuelwood Supply Value Chain to Increase Access to Efficient and Clean Cooking in Bangladesh	Efficient, Clean Cooking & Heating
Burundi	Burundi Landscape Restoration and Resilience Project	Efficient, Clean Cooking & Heating
Dominican Republic	Technical Assistance for Distribution Grid Modernization and Loss Reduction in the Dominican Republic	Energy Access for Urban Poor
Global	GIS Electrification Planning Global	SEforALL TA
Global	SEforALL Technical Assistance PMA	SEforALL TA
Malawi	Malawi: National Electrification Strategy	SEforALL TA
Mongolia	Support to the Preparation of Electricity for Heating Program in Ulaanbaatar GMP	Efficient, Clean Cooking & Heating
Myanmar	Off-Grid Access in Myanmar	Lighting Global, Green Mini Grids
Pakistan	Pakistan: Punjab Energy Efficient Municipal Service EE	Lighting Global

Pakistan	Pakistan: Renewable Energy for Rural Off-Grid Electrification	Lighting Global
Tanzania	Tanzania: National Urban Electrification Scale-Up	Energy Access for Urban Poor
Tanzania	Tanzania Power Sector Review [GMP, RE]	SEforALL TA
Yemen, Republic of	Yemen: Support to Recovery of Electricity Services	Energy Access for Urban Poor

ENERGY EFFICIENCY

AFR	Energy Efficiency Investment Opportunities in Africa	Energy Efficient Buildings, Energy Efficient City Services
Albania	Development of a Financing Mechanism for Energy Efficient Public Buildings in Albania	Energy Efficient Buildings
Belarus	Belarus: Market Assessment for the Thermal Retrofit of Multi-Apartment Buildings [GMP]	Energy Efficient Buildings
Chile	Local Action to Support Chile's Nationally Determined Contributions Achievement (Energy Efficiency Building Retrofits)	Energy Efficient Buildings
Egypt, Arab Republic of	Egypt: Alternative Fuels and Raw Materials for Cement	Energy Efficient City Services
Georgia	Georgia's Energy Efficiency and Social Equity	Energy Efficient Buildings
Georgia	Tbilisi Energy Efficiency Enhancement for Urban Regeneration	Energy Efficient Buildings, Energy Efficient City Services
Global	City Energy Efficiency Transformation	Energy Efficient City Services
Global	IFC EDGE Program: China, Nigeria, and Certification for Existing Buildings	Energy Efficient Buildings
Global	Leaders in Urban Transport Planning-Tech Content	Energy Efficient City Services
India	India Capacity Building in Bus Fuel Efficiency II	Energy Efficient City Services
India	Implementation Plan for E-Mobility in Kolkata, India	Energy Efficient City Services
Indonesia	Scaling Up Energy Efficiency in Indonesia	Energy Efficient Buildings, Energy Efficient City Services
Jordan	Jordan: Designing a Program for Energy Efficiency Improvement in Residential Buildings	Energy Efficient Buildings
Kyrgyz Republic	Enhancing Energy Efficiency of Education Facilities in Kyrgyzstan	Energy Efficient Buildings
Marshall Islands	Promotion of Energy Efficiency Program — Republic of Marshall Islands	Energy Efficient Buildings
Mexico	Improving Energy Efficiency in Schools and Hospitals in Mexico	Energy Efficient Buildings
Mongolia	IFC: Energy Asset Rating for Mongolian Buildings	Energy Efficient Buildings
Montenegro	Montenegro: Sustainable Energy Efficiency Financing for Public Buildings	Energy Efficient Buildings
Pakistan	Pakistan: Punjab Energy Efficient Municipal Service [EA]	Energy Efficient City Services
Serbia	Study of Potential for Transit-Oriented Development and Land Based Financing in Belgrade	Energy Efficient City Services
Turkey	Turkey: Sustainable Financing Mechanism for Energy Efficiency Renovations in Municipal Buildings [GMP]	Energy Efficient Buildings
Uzbekistan	Urban Heating Strategy for Uzbekistan	Energy Efficient City Services
Uzbekistan	Uzbekistan: Energy Efficiency in Water Utilities	Energy Efficient City Services
Vietnam	Energy Efficiency Improvement in Water and Wastewater Management in Vietnam	Energy Efficient City Services
Vietnam	Improving Energy Efficiency in Vietnam	Energy Efficient Buildings, Energy Efficient City Services

GOVERNANCE, MARKETS & PLANNING

AFR	Facilitating Power Trade in Sub-Saharan Africa
AFR	Reform Options for the Bi-national Power Generation and Transmission Utility of Benin and Togo
Armenia	Preparation of Model Power Purchase Agreement for Small Renewable Energy Projects in Armenia
Bangladesh	Scaling Up Renewable Energy in Bangladesh
Belarus	Belarus: Market Assessment for the Thermal Retrofit of Multi-Apartment Buildings [EE]
Belarus	Belarus Power Sector Study
Brazil	Brazilian Power Sector Reform: Technical Review and Inputs to Consultation Process
Brazil	Dissemination of Results: The Power and Gas Sector Reform in Brazil
China	Supporting Power Sector Reform to Promote Energy Transition in China
Colombia	Support to Conference: "Dialogues on the Future of Energy 2017"
Djibouti	Djibouti Power Sector Diagnostic
Dominica	Preparation of Dominica Geothermal Risk Mitigation Project
ECA	Just-in-Time Renewable Energy Development Support for Central Asia [RE]
Georgia	Analytical Support for Assessment of Contingent Liabilities
Global	Off-Grid Electrification Power Systems Planning
India	Supporting Government of India's 24x7 Power for All Program
Kyrgyz Republic	Energy Efficiency Improvements in Public Buildings in the Kyrgyz Republic
Lebanon	Engaging in Difficult Electricity Subsidies and Tariff Reform: The Case of the Lebanese Republic
MNA	Increasing Pan-Arab Regional Energy Trade
Moldova	Promoting Competition in Moldovan Electric Power Market through Regional Integration
Mongolia	Support to the Preparation of Electricity for Heating Program in Ulaanbaatar [EA]
Myanmar	Support for Implementation of the Sustainable Energy for All and National Electrification Program in Myanmar
Myanmar	Support for Renewable Energy Development in Myanmar
Nepal	Solar Measurement Campaign in Nepal and Additional Budget for Renewable Energy Resource Mapping and Geospatial Planning
Nigeria	Nigeria — Preparation and Implementation Support for a Power Sector Recovery Program [SR]
Pakistan	Support for Hydropower Development in Khyber Pakhtunkhwa
Philippines	Agus Hydropower Cascade Rehabilitation
SAR	Energy Sector Engagement Strategies for South Asia
SAR	South Asia Gender and Energy (Sage) Facility [GMP]
Sri Lanka	Sri Lanka Energy InfraSAP
Sudan	Sudan Electricity Sector Development Policy Note [SR]
Tanzania	Tanzania Power Sector Review [RE, EA]

Tunisia	Enhancing the Performance and Financial Viability of the Tunisian Energy Sector [SR]	
Tunisia	Power Interconnector — Project Preparation Technical Assistance in the Republic of Tunisia (Bank-Executed Trust Fund)	
Turkey	Turkey: Sustainable Financing Mechanism for Energy Efficiency Renovations in Municipal buildings [EE]	
Ukraine	Development of Market Compatible Renewable Energy Framework in Ukraine [RE]	
Ukraine	Support to Implementation of Reforms in Ukrainian Gas Sector	
Uzbekistan	Uzbekistan: Strategic Advisory for Improvement in Corporate Governance	
Vietnam	Vietnam: Preparing for Liquefied Natural Gas Imports	
Zimbabwe	Zimbabwe Power Sector Technical Assistance	

RENEWABLE ENERGY

AFR	Hydro-connected Solar PV towards Accelerating Utility Scale Solar Generation in West Africa	Solar Scale-Up Program
Bangladesh	Scaling Up Renewable Energy in Bangladesh [GMP]	Solar Scale-Up Program, RE Mapping
Central African Republic	Support for the Promotion and Implementation of Solar PV Projects in Central African Republic	Solar Scale-Up Program
ECA	Just-in-Time Renewable Energy Development Support for Central Asia	Solar Scale-Up Program
Egypt, Arab Republic of	Support for Egypt–World Bank Group Partnership for the Design and Implementation of Solar Photovoltaic Auctions	Solar Scale-Up Program
Global	ESMAP Solar Scale-Up Program	Solar Scale-Up Program
Global	Global Geothermal Development Plan	Global Geothermal Development Plan
Global	Global Solar Atlas II	RE Mapping
Global	International Solar Alliance (ISA) Support	Solar Scale-Up Program
Global	Renewable Energy Resource Assessment and Mapping Initiative	RE Mapping
Global	Renewable Energy Resource Mapping: Knowledge Management	RE Mapping
Guinea Bissau	Utility-Scale Solar-Plus-Storage for Energy Security in Guinea Bissau	Solar Scale-Up Program
India	India: Grid Integration Support for Power System Operation Corporation Limited (POSOCO)	Integrating Variable Renewables
Indonesia	Indonesia: Resource Risk Mitigation for Geothermal Development	Global Geothermal Development Plan
Indonesia	Support for Indonesia–World Bank Group Partnership for the Design and Implementation of Solar PV Auctions	Integrating Variable Renewables, Solar Scale-Up Program
LAC	Upstream Analysis for the Development of the Scaling Solar Program in Nicaragua	Solar Scale-Up Program
MNA	Comparative Analysis of Utility-scale Energy Storage: Options in the MNA Region	Integrating Variable Renewables
Mongolia	Support Mongolia with price setting of Solar Energy	Solar Scale-Up Program
Mongolia	Sustainable Energy Development in Mongolia	Integrating Variable Renewables

Niger	Niger Solar Development — Zinder Project Pre-feasibility Analysis	Integrating Variable Renewables, Solar Scale-Up Program
Tanzania	Tanzania Power Sector Review EA, GMP	Solar Scale-Up Program
Turkey	Turkey Geothermal Development Project (CO_2 Soil Emissions Study)	Global Geothermal Development Plan
Ukraine	Development of Market Compatible Renewable Energy Framework in Ukraine GMP	Solar Scale-Up Program
Vietnam	Accommodating the 20 GW Variable Renewable Energy Target for 2030 in Vietnam Power System	Solar Scale-Up Program

SEforALL KNOWLEDGE HUB

Global	Global Survey for Multi-Tier Energy Access Tracking 2	
Global	SDG 7 Tracking Report 2018	

SUBSIDY REFORM

AFR	Electricity Subsidy Reform in Guinea, Mali, and Togo	
Burkina Faso	Subsidy Reform in Burkina Faso	ESRAF
Global	Efficient Clean Cooking and Heating (ECCH)	
Jordan	Jordan: Expansion of Social Safety Nets to Support Electricity Lifeline Tariff Rationalization	ESRAF
Kosovo	Kosovo Power Sector Financial Recovery and Electricity Tariff Subsidy Reform	
LAC	Dialogue on the Role of Regulators Regarding Fossil Fuel Subsidies in the Transition towards the Energy Sector of the Future	
LAC	Honduras: Toward Cost-Reflective Tariff Regulation for the Power Sector	
Madagascar	Madagascar: Energy Sector Financial Sustainability Studies	
Mongolia	Support for Sustainable and Socially Inclusive Electricity and Heat Pricing Reform in Mongolia	
Mozambique	Support to the Implementation of Mozambique's Fuel Subsidy Reform	
Nigeria	Nigeria — Preparation and Implementation Support for a Power Sector Recovery Program GMP	
Rwanda	Rwanda: Power Sector Sustainability Study	
Sudan	Sudan Electricity Sector Development Policy Note GMP	
Tajikistan	Tajikistan Electricity Tariff Setting and Mitigation of Social Impacts	
Tunisia	Enhancing the Performance and Financial Viability of the Tunisian Energy Sector GMP	
Uzbekistan	Energy Subsidies in Uzbekistan: Impact and the Way Forward (Phase I)	

Table C.3| ESMAP Ongoing Activities, FY2018

COUNTRY/ REGION	NEW ACTIVITY	PRIORITY (if applicable)
ENERGY ACCESS		
AFR	Africa Clean Cooking Energy Solutions (ACCES) — Phase II	Efficient, Clean Cooking & Heating
AFR	Africa Regional Geospatial Planning Support	SEforALL TA
AFR	Increased Electricity Access Support (AGAT)	SEforALL TA, Green Mini Grids
AFR	Integrating Bio-digesters for Cooking into Small Farm Activities	Efficient, Clean Cooking & Heating
AFR	Lighting Africa	Lighting Global
AFR	Regional Coordination of Africa SEforALL Technical Assistance Program	SEforALL TA, Lighting Global, Energy Access for Urban Poor, Green Mini Grids, Efficient, Clean Cooking & Heating
Burundi	Burundi Landscape Restoration and Resilience Project	Efficient, Clean Cooking & Heating
Burundi	SEforALL Technical Assistance for Burundi	SEforALL TA
Colombia	Colombia: Energy Sector Engagement	SEforALL TA, Lighting Global
Congo, Democratic Republic of	AFREA II: DRC — Scaling Up Electricity Access	SEforALL TA, Energy Access for Urban Poor
Dominican Republic	Technical Assistance for Distribution Grid Modernization and Loss Reduction in the Dominican Republic	Energy Access for Urban Poor
ECA	Clean and Efficient Heating in Kyrgyzstan and Tajikistan	Efficient, Clean Cooking & Heating
Global	Efficient, Clean Cooking and Heating (ECCH) Program	Efficient, Clean Cooking & Heating
Global	Energy Access for the Peri-urban/Urban Poor	Energy Access for Urban Poor
Global	GIS Electrification Planning Global	SEforALL TA
Global	Global Facility for Promotion of Green Mini Grids	Green Mini Grids
Global	Lighting Global — ESMAP Own-Managed	Lighting Global
Global	SEforALL Technical Assistance PMA	SEforALL TA
Guinea	SEforALL Technical Assistance for Guinea	SEforALL TA
India	India Efficient, Clean Cooking and Heating (ECCH)	Efficient, Clean Cooking & Heating
Kenya	Kenya Geospatial Plan [RE]	Green Mini Grids
Kyrgyz Republic	Kyrgyzstan Improving Efficiency of Individual Heating Solutions	Efficient, Clean Cooking & Heating
Lao PDR	Lao PDR Cook Stove Initiative	Efficient, Clean Cooking & Heating
Liberia	Liberia Renewable Energy Access Project	Green Mini Grids
Liberia	SEforALL Technical Assistance for Liberia	SEforALL TA
Malawi	Malawi: National Electrification Strategy	SEforALL TA
Mali	Mali Rural Electrification Hybrid System: China Environmental Management Group (CEMG) Initiative	Green Mini Grids
MNA	Africa Regional Geospatial Planning Support	SEforALL TA

Moldova	Moldova: Just-in-Time Support to Streamlining of District Heating Regulatory Methodologies and Processes [EE]	Efficient, Clean Cooking & Heating, Energy Access for Urban Poor
Mongolia	Support to the Preparation of Electricity for Heating Program in Ulaanbaatar [GMP]	Efficient, Clean Cooking & Heating
Mozambique	SEforALL TA for Mozambique	SEforALL TA, Green Mini Grids, Energy Access for Urban Poor, Lighting Global
Myanmar	Off-Grid Access in Myanmar	Lighting Global, Green Mini Grids
Nepal	Nepal: Developing Improved Solutions for Cooking	SEforALL TA
Nepal	Nepal: Project Preparation for Business Models for Private Sector-Led Mini-Grid Energy Access Project	Green Mini Grids
Niger	Niger: Support to Innovative Financing Mechanisms and Business Models to Increase Access through Solar Technologies	Green Mini Grids, Lighting Global, and Energy Access for Urban Poor
Pakistan	Pakistan: Punjab Energy Efficient Municipal Service [EE]	Lighting Global
Pakistan	Pakistan: Renewable Energy for Rural Off-Grid Electrification	Lighting Global
Senegal	SEforALL TA for Senegal	SEforALL TA
Tanzania	Tanzania: National Urban Electrification Scale-Up	Energy Access for Urban Poor
Tanzania	Tanzania Power Sector Review [GMP, RE]	SEforALL TA
Ukraine	Ukraine: Technical Assistance for the Ukraine District Heating Energy Efficiency Project [EE]	Efficient, Clean Cooking & Heating

ENERGY EFFICIENCY

AFR	Energy Efficiency Investment Opportunities in Africa	Energy Efficient Buildings, Energy Efficient City Services
Argentina	Metropolitan Buenos Aires: Efficient and Sustainable Urban Settlements	Energy Efficient City Services
Belarus	Belarus: Market Assessment for the Thermal Retrofit of Multi-Apartment Buildings [GMP]	Energy Efficient Buildings
Brazil	FinBRAZEEC Project Preparation [RE]	Energy Efficient Buildings, Energy Efficient City Services
China	Supporting Implementation of New Urbanization Strategy in Chongqing	Energy Efficient City Services
China	Supporting Project Preparation of Shanghai Urbanization Financing and Innovation Project	Energy Efficient City Services
Côte d'Ivoire	Urban Density and Quality Buildings for an Energy Efficient Abidjan	Energy Efficient Buildings
ECA	Energy, Gender, and Social Inclusion in the ECA Region	Energy Efficient City Services
ECA	Financing of Public Buildings in the Western Balkans [GMP]	Energy Efficient Buildings
Georgia	Tbilisi Energy Efficiency Enhancement for Urban Regeneration	Energy Efficient Buildings, Energy Efficient City Services
Global	City Energy Efficiency Transformation Initiative: Low Carbon Growth for Cities through Energy Efficiency	Energy Efficient City Services
Global	Efficient and Sustainable Buildings	Energy Efficient Buildings
Global	Exploring the Potential for the Application of Solar Photovoltaic Pumping Technologies in the Water	Energy Efficient City Services
Global	IFC EDGE Program: China, Nigeria, and Certification Existing Buildings	Energy Efficient Buildings
Global	Leaders in Urban Transport Planning-Tech Content	Energy Efficient City Services
Global	Scaling Up Energy Efficiency Investments in Water Utilities	Energy Efficient City Services

India	Implementation Plan for E-Mobility in Kolkata, India	Energy Efficient City Services
India	India Capacity Building in Bus Fuel Efficiency II	Energy Efficient City Services
India	India: Strategic Options for EE Scale-up [GMP]	Energy Efficient Buildings
Indonesia	Scaling Up Energy Efficiency in Indonesia	Energy Efficient Buildings, Energy Efficient City Services
Jordan	Jordan: Designing a Program for Energy Efficiency Improvement in Residential Buildings	Energy Efficient Buildings
Kazakhstan	Energy Efficiency Transformation in Astana and Almaty [GMP]	Energy Efficient Buildings, Energy Efficient City Services
Kyrgyz Republic	Energy Efficiency in Public Buildings in Kyrgyzstan	Energy Efficient Buildings
Kyrgyz Republic	Enhancing Energy Efficiency of Education Facilities in Kyrgyzstan	Energy Efficient Buildings
LAC	Towards an Effective Implementation of Energy Efficiency Initiatives in Panama	Energy Efficient Buildings, Energy Efficient City Services
Lebanon	Lebanon: Promoting Energy Efficiency in Bus Rapid Transit	Energy Efficient City Services
Marshall Islands	Promotion of Energy Efficiency Program — Republic of Marshall Islands	Energy Efficient Buildings
Mexico	Improving Energy Efficiency in Schools and Hospitals in Mexico	Energy Efficient Buildings
Mexico	Mexico: Sustainable Land Use for Energy Efficient Cities	Energy Efficient City Services
Moldova	Moldova: Just-in-Time Support to Streamlining of District Heating Regulatory Methodologies and Processes [GMP, EA]	Energy Efficient City Services
Mongolia	IFC: Energy Asset Rating for Mongolian Buildings	Energy Efficient Buildings
Mongolia	Ulaanbaatar Efficient Heating Project	Energy Efficient Buildings, Energy Efficient City Services
Montenegro	Montenegro: Sustainable Energy Efficiency Financing for Public Buildings	Energy Efficient City Services
Morocco	Morocco City Energy Efficiency [GMP]	Energy Efficient City Services
Pakistan	Pakistan: Punjab Energy Efficient Municipal Service [EA]	Energy Efficient City Services
Serbia	Study of Potential for Transit-Oriented Development and Land Based Financing in Belgrade	Energy Efficient City Services
Ukraine	Ukraine District Heating Sector Transition [GMP]	Energy Efficient City Services
Ukraine	Ukraine: Sustainable Urban Mobility for Odessa	Energy Efficient City Services
Ukraine	Ukraine: Technical Assistance for the Ukraine District Heating Energy Efficiency Project [EA]	Energy Efficient Buildings, Energy Efficient City Services
Uzbekistan	Towards Energy Efficient Resilient Cities in Uzbekistan	Energy Efficient City Services
Uzbekistan	Uzbekistan: Energy Efficiency in Water Utilities	Energy Efficient City Services
Vietnam	Energy Efficiency Improvement in Water and Wastewater Management in Vietnam	Energy Efficient City Services
Vietnam	Improving Energy Efficiency in Vietnam	Energy Efficient Buildings, Energy Efficient City Services
Vietnam	Vietnam Energy Efficiency for Industrial Enterprises Global Citizen Foundation Proposal	Energy Efficient City Services

GOVERNANCE, MARKETS & PLANNING

AFR	AFREA 2: Africa Clean Cooking Energy Solutions (ACCES)	
AFR	AFREA 2: Gender and Energy Program [O]	
AFR	Africa Energy Strategy	
AFR	Facilitating Power Trade in Sub-Saharan Africa	
AFR	Increased Electricity Access Support (AGAT) [EA]	
AFR	Lighting Africa [EA]	
AFR	Operational Support — AFREA2	

AFR	Reform Options for the Bi-National Power Generation and Transmission Utility of Benin and Togo
Afghanistan	Afghanistan: Energy Study
Albania	Power Exchange Implementation Support in Albania
Armenia	Preparation of Model Power Purchase Agreement for Small Renewable Energy Projects in Armenia
Bangladesh	Scaling Up Renewable Energy in Bangladesh [RE]
Belarus	Belarus: Market Assessment for the Thermal Retrofit of Multi-Apartment Buildings [EE]
Belarus	Belarus Power Sector Study
Botswana	Botswana Renewable Energy and Energy Efficiency Strategies
Brazil	Brazilian Power Sector Reform: Technical Review and Inputs to Consultation Process
Brazil	Dissemination of Results: The Power and Gas Sector Reform in Brazil
Brazil	Revisiting Power and Gas Sector Reforms in Brazil [SR, RE]
China	Promotion of Power Sector Reform to Unlock Renewable Energy Development
China	Supporting Power Sector Reform to Promote Energy Transition in China
Congo, Democratic Republic of	AFREA II: DRC — Scaling Up Electricity Access [EA]
Congo, Democratic Republic of	DRC Power Sector Report and Policy Dialogue
Congo, Republic of	Republic of Congo: Power Sector Reform and Electricity Access Support [SR, EA]
Côte d'Ivoire	Côte d'Ivoire: CI Electricity Access Scale Up Program
Djibouti	Djibouti Power Sector Diagnostic
Dominica	Preparation of Dominica Geothermal Risk Mitigation Project
EAP	Dissemination and Knowledge Sharing
EAP	Greater Mekong Sub-Region (GMS) Power Market Development Programmatic Technical Assistance
ECA	Financing of Public Buildings in the Western Balkans [EE]
Egypt, Arab Republic of	Programmatic Energy Reforms in Egypt — Technical Assistance
Ethiopia	Ethiopia Energy Sector Review and Strategy [SR, RE]
Ghana	Ghana Energy Sector Reform Support
Global	East Asia and Pacific Gender and Energy Facility
Global	Off-Grid Electrification Power Systems Planning
Global	Rethinking Power Sector Reform
India	India: North East Region — Assessment of Training and Development Projects Impact on Access to Electricity
India	India: Strategic Options for Energy Efficiency Scale-up [EE]
India	India: Support to Electricity Distribution System Strengthening and Modernization in Andhra Pradesh
India	India: Support to 24x7 Scheme for Jharkhand [RE]
India	Supporting Government of India's 24X7 Power for All Program

Indonesia	Local Benefit Sharing for Hydropower Projects in Indonesia
Indonesia	Support to the Integrated Catchment Management (ICM)–Informed Project Preparation of Matenggeng Pumped Storage Hydro-Electrical Project
Iraq	Iraq Power Sector Planning and Operations Improvement
Kazakhstan	Energy Efficiency Transformation in Astana and Almaty [EE]
Kenya	Kenya: Implementation Roadmap of Energy Bill
Kenya	Kenya Geospatial Plan [EA, RE]
Kyrgyz Republic	Energy Efficiency Improvements in Public Buildings in the Kyrgyz Republic
LAC	Assessment of Geothermal Potential in LAC
LAC	Caribbean Energy Sector Strategic Support
LAC	LAC Energy and Gender Program
Malawi	Malawi: Energy Policy Review and Sector Engagement Strategy
MNA	MNA Energy and Gender Program
MNA	Increasing Pan-Arab Regional Energy Trade
Moldova	Moldova: Just-in-Time Support to Streamlining of District Heating Regulatory Methodologies and Processes [EA, EE]
Moldova	Promoting Competition in Moldovan Electric Power Market Through Regional Integration
Mongolia	Support to the Preparation of Electricity for Heating Program in Ulaanbaatar [EA]
Morocco	Morocco City Energy Efficiency [EE]
Mozambique	SEforALL Technical Assistance for Mozambique [EA]
Myanmar	Myanmar National Electrification Project: Inclusive Community Participation
Myanmar	Support for Implementation of the Sustainable Energy for All and National Electrification Program in Myanmar
Myanmar	Support for Renewable Energy Development in Myanmar
Nepal	Solar Measurement Campaign in Nepal and Additional Budget for Renewable Energy Resource Mapping
Niger	PV Hybridization of Diesel-based Isolated Grids [EA, RE]
Nigeria	Nigeria: Preparation and Implementation Support for a Power Sector Recovery Program [SR]
Pakistan	Support for Hydropower Development in Khyber Paktunkhwa
Papua New Guinea	PNG: National Policy on Benefit Sharing in Hydropower Projects
Philippines	Augus Hydropower Cascade Rehabilitation
São Tomé and Príncipe	São Tomé and Príncipe: Strengthening Energy Monitoring/Planning
SAR	Energy Sector Engagement Strategies for South Asia
SAR	South Asia Gender and Energy (SAGE) Facility [GMP]
Sri Lanka	Sri Lanka Energy InfraSAP
Somalia	AFREA 2: Somalia Power Sector Development Master Plan
Solomon Islands	Tina River Hydropower Development Project: Benefit Sharing and Technical Quality Assurance
Sudan	Sudan Electricity Sector Development Policy Note [SR]
Tanzania	Tanzania Power Sector Review [RE, EA]

Tunisia	Enhancing the Performance and Financial Viability of the Tunisian Energy Sector	
Uganda	AFREA II — Uganda Clean Cooking Supply Chain Expansion	
Ukraine	Facilitating Electricity and Gas Market Reforms in Ukraine	
Ukraine	Market Assessment of Small Hydro Rehabilitation in Ukraine	
Ukraine	Support to Implementation of Reforms in Ukrainian Gas Sector	
Ukraine	Ukraine: Advancing Energy Tariff and Subsidy Reform Implementation	
Ukraine	Ukraine District Heating Sector Transition [EE]	
Uzbekistan	Uzbekistan Power System Dispatch and Renewable Energy Integration [RE]	
Vietnam	Vietnam: Preparing of Liquified Natural Gas Imports	
Zimbabwe	Zimbabwe Power Sector Technical Assistance	

OTHER

AFR	AFREA 2 Gender and Energy Program [GMP]	
Global	Gender: Knowledge Dev and Dissemination	
Lao PDR	Renewable Energy Resource Mapping: Lao PDR [RE]	

RENEWABLE ENERGY

AFR	Hydro-Connected Solar PV towards Accelerating Utility Scale Solar Generation in West Africa	Solar Scale-Up Program
AFR	Solar Resource Mapping: East Africa	RE Mapping, Solar Scale-Up Program
AFR	Variable Renewable Integration in the West Africa Power Pool Grid	Integrating Variable Renewables
Armenia	Armenia: VRE Grid Integration Support	Integrating Variable Renewables, Solar Scale-Up Program
Bangladesh	Renewable Energy Resource Mapping Bangladesh — ESMAP	RE Mapping
Bangladesh	Scaling Up Renewable Energy in Bangladesh [GMP]	Solar Scale-Up Program, RE Mapping
Brazil	FinBRAZEEC Project Preparation [EE]	Integrating Variable Renewables, Solar Scale-Up Program
Brazil	Revisiting Power and Gas Sector Reforms in Brazil [GMP, SR]	Integrating Variable Renewables
Cabo Verde	Cabo Verde: Distributed Renewable Energy	Integrating Variable Renewables
Central African Republic	Support for the Promotion and Implementation of Solar PV Projects in Central African Republic	Solar Scale-Up Program
Chile	Technical Assistance for Sustainable Geothermal Development in Chile	Global Geothermal Development Plan
EAP	VRE Grid Integration for Pacific Islands Sustainable Energy Industry Development Project	Integrating Variable Renewables
Egypt, Arab Republic of	Support for Egypt–World Bank Group Partnership for the Design and Implementation of Solar PV Auctions	Solar Scale-Up Program
Ethiopia	Ethiopia Energy Sector Review and Strategy [GMP, SR]	Integrating Variable Renewables, Solar Scale-Up Program, Global Geothermal Development Plan

Ethiopia	Ethiopia Renewable Energy Resource Mapping	RE Mapping
Global	ESMAP — Effectiveness of Public Finance in Attracting Private Capital for Grid-Connected Solar Projects	Solar Scale-Up Program
Global	ESMAP Solar Support Program	Solar Scale-Up Program
Global	ESMAP Variable Renewable Energy Grid Integration Support Program	Integrating Variable Renewables
Global	Global Geothermal Development Plan	Global Geothermal Development Plan
Global	Global Solar Atlas	RE Mapping
Global	Global Wind Atlas	RE Mapping
Global	International Solar Alliance (ISA) Support	Solar Scale-Up Program
Global	Renewable Energy Resource Assessment and Mapping Initiative	RE Mapping
Global	Renewable Energy Resource Mapping	RE Mapping
Guinea-Bissau	Utility-Scale Solar-Plus-Storage for Energy Security in Guinea Bissau	Solar Scale-Up Program
Haiti	Haiti Solar and VRE Integration	Integrating Variable Renewables, Solar Scale-Up Program
India	India: Grid Integration Support for Power System Operation Corporation Limited (POSOCO)	Integrating Variable Renewables
India	India — Support to 24x7 Scheme for Jharkhand [GMP]	Integrating Variable Renewables
Indonesia	Indonesia Capacity Strengthening and Risk Mitigation for Geothermal Development	Global Geothermal Development Plan
Indonesia	Indonesia: Resource Risk Mitigation for Geothermal Development	Global Geothermal Development Plan
Indonesia	Support for Indonesia–World Bank Group Partnership for the Design and Implementation of Solar PV Auctions	Integrating Variable Renewables, Solar Scale-Up Program
Kenya	Kenya Geospatial Plan [GMP, EA]	Integrating Variable Renewables, Solar Scale-Up Program, RE Mapping
Lao PDR	Renewable Energy Resource Mapping: Lao PDR	RE Mapping
LAC	Technical Assistance for Geothermal Project Preparation in LAC	Global Geothermal Development Plan
LAC	Upstream Analysis for the Development of the Scaling Solar Program in Nicaragua	Solar Scale-Up Program
Malawi	Renewable Energy Resource Mapping and Geospatial Planning: Malawi	RE Mapping, Solar Scale-Up Program
Maldives	Renewable Energy Resource Mapping and Geospatial Planning: Maldives	RE Mapping
MNA	Comparative Analysis of Utility-scale Energy Storage: Options in the MNA Region	Integrating Variable Renewables
Mongolia	Sustainable Energy Development in Mongolia	Integrating Variable Renewables
Nepal	RE Resource Mapping: Nepal	RE Mapping
Niger	Niger Solar Development – Zinder Project Pre-Feasibility Analysis	Integrating Variable Renewables, Solar Scale-Up Program
Niger	PV Hybridization of Diesel-based Isolated Grids [GMP, EA]	Solar Scale-Up Program
Pakistan	Renewable Energy Resource Mapping and Geospatial Planning: Pakistan	RE Mapping

Papua New Guinea	Renewable Energy Resource Mapping and Geospatial Planning: Papua New Guinea	RE Mapping
Tanzania	Renewable Energy Resource Mapping and Geospatial Planning: Tanzania	RE Mapping
Tanzania	Tanzania Power Sector Review GMP, EA	Solar Scale-Up Program
Turkey	Turkey Geothermal Development Project (CO_2 Soil Emissions Study)	Global Geothermal Development Plan
Uzbekistan	Uzbekistan Power System Dispatch and Renewable Energy Integration GMP	Integrating Variable Renewables
Vietnam	Accommodating the 20 GW Variable Renewable Energy Target for 2030 in Vietnam Power System	Integrating Variable Renewables
Vietnam	Renewable Energy Resource Mapping and Geospatial Planning: Vietnam	RE Mapping
Vietnam	Scaling Up Solar PV in Vietnam	Solar Scale-Up Program
Zambia	Zambia Renewable Energy Resource Mapping Initiative	RE Mapping
SEforALL KNOWLEDGE HUB		
Global	Global Rollout of Readiness for Investment in Sustainable Energy (RISE)	
Global	Global Survey for Multi-Tier Energy Access Tracking	
Global	MTF Enterprise Survey	
Global	SDG 7 Tracking Report 2018	
Global	SEAR Dissemination	
SUBSIDY REFORM		
AFR	Electricity Subsidy Reform in Guinea, Mali, and Togo	
Algeria	Energy Subsidies and Price Reform in Algeria	
Armenia	Armenia: Improvement of Power-Tariff Setting and Addressing of Social Impacts of Tariff Increases	
Azerbaijan	Poverty and Social Impacts of Improving Fiscal Sustainability and Quality of Power Distribution in Azerbaijan	
Belarus	Belarus Heat Tariff Reform and Social Impact Mitigation Study	
Brazil	Revisiting Power and Gas Sector Reforms in Brazil GMP, RE	
Burkina Faso	Subsidy Reform in Burkina Faso	ESRAF
Congo, Republic of	Republic of Congo: Power Sector Reform and Electricity Access Support GMP, EA	
Ethiopia	Ethiopia Energy Sector Review and Strategy GMP, RE	
Global	Efficient Clean Cooking and Heating (ECCH)	
Global	Energy Subsidy Reform and Delivery: Safeguarding the Poor and Vulnerable	
Global	Energy Subsidy Reform Assessment Framework (ESRAF)	ESRAF
Global	Energy Subsidy Reform Knowledge Events	
Global	Energy Subsidy Reform Knowledge Products	
Global	Energy Subsidy Reform Online Community	
Haiti	Distributional Analyses and Reform Options for Petroleum Price Reforms in Haiti — Phase II	
India	India: Direct Benefit Transfer for Electricity to Farmers in Rajasthan	
Jordan	Jordan: Expansion of Social Safety Nets to Support Electricity Lifeline Tariff Rationalization	ESRAF
Kyrgyz Republic	Energy Sector Reforms in Kyrgyz Republic	

LAC	Dialogue on the Role of Regulators Regarding Fossil Fuel Subsidies in the Transition towards the Energy Sector of the Future
LAC	Honduras: Toward Cost-Reflective Tariff Regulation for The Power Sector
Madagascar	Madagascar Pump Fuel Price Subsidy Removal Technical Assistance
MNA	Support to MENA Countries Preparedness of SSNs for Subsidy Reform — Algeria, Djibouti, Jordan, Morocco, Tunisia, Yemen
Mongolia	Support for Sustainable and Socially Inclusive Electricity and Heat Pricing Reform in Mongolia
Mozambique	Support to the Implementation of Mozambique's Fuel Subsidy Reform
Myanmar	Myanmar: Support for Sustainable and Socially Inclusive Electricity Pricing and Reform
Nepal	Energy Tariff Reform in Nepal
Rwanda	Rwanda: Power Sector Sustainability Study
Tajikistan	Tajikistan Electricity Tariff Setting and Mitigation of Social Impacts
Uzbekistan	Energy Subsidies in Uzbekistan: Impact and the Way Forward (Phase 1)
Ukraine	Ukraine Energy Efficiency Fund Development Technical Assistance
Vietnam	Vietnam: Energy Subsidy Reform Phase 1

ANNEX D

ESMAP PUBLICATIONS, FY 2018

ISBN, PUB NO., OR PROJECT NO.	COUNTRY/ REGION	TITLE	AUTHOR/TTL
Live Wire 2017/85	Afghanistan	A GIS Approach to Planning Electrification in Afghanistan	Alexandros Korkovelos, Morgan Bazilian, Dimitrios Mentis, Mark Howells
P150323	AFR	Double Dividend: Power and Agriculture Nexus in Sub-Saharan Africa	Sudeshna Ghosh Banerjee, Kabir Malik, Andrew Tipping, Juliette Suzanne Georgette Besnard, John D. Nash
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P157812	Global	Guidance for Comprehensive Energy Subsidy Reforms: Energy Subsidy Reform Assessment Framework (ESRAF) Good Practice Note, Overview	Thomas Flochel, Sudarshan Gooptu
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Journal of Environmental Economics and Management, Vol. 88 (2018)	Global	When Starting with the Most Expensive Option Makes Sense: Optimal Timing, Cost, and Sectoral Allocation of Abatement Investment	Adrien Camille Vogt-Schilb, Guy Meunier, Stephane Hallegatte
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WB Policy Research Working Paper 8461	Global	Taking Stock of Economic Regulation of Power Utilities in the Developing World: A Literature Review	Martin Augusto Rodriguez Pardina, Julieta Schiro
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Energy Sector Management Assistance Program
The World Bank

1818 H Street, N.W.
Washington, DC 20433 USA
esmap.org | esmap@worldbank.org