External Evaluation of the Energy Sector Management Assistance Program (ESMAP)

Final Evaluation Report

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Contents

Acronyms

ABG	Annual Block Grants
ADB	Asian Development Bank
AF	Additional financing
AFD	French Development Agency
AfDB	African Development Bank
AFREA	Africa Renewable Energy and Access program
AMDA	Africa Minigrid Developers Association
ASA	Advisory service and analytics
ASTAE	Asia Sustainable and Alternative Energy Program
BEIS	Department for Business, Energy and Industrial Strategy (United Kingdom)
BREB	Bangladesh Rural Electrification Board
CCAP	Climate Change Action Plan
CG	Consultative Group
CPF	Country Partnership Frameworks and Strategies
CTF	Clean Technologies Fund
CVP	Communication & Visibility Plan
DESCO	Distributed energy services companies
DFID	Department for International Development (United Kingdom)
DPF	Development policy lending
DRC	Democratic Republic of Congo
EA	Energy Access
EAP	East Asia Pacific
EBRD	European Bank for Reconstruction and Development
ECA	Europa and Central Asia
ECCH	Efficient, clean cooking and heating
ECCP	Efficient, Clean Cooling Program
ECOWAS	Economic Community of West African States
EE	Energy Efficiency
EEU	Ethiopian Electric Utility
EEX	Energy & Extractives
EIB	European Investment Bank
ERAV	Electricity Regulatory Authority of Vietnam
ESCO	Energy service company
ESRAF	ESR Assessment Framework
ESMAP	Energy Sector Management Assistance Program
ESP	Energy Storage Partnership
ESR	Energy Subsidy Reform
ESRF	Energy Subsidy Reform Facility
ESROC	ESR Online Community
EVN	Electricity Vietnam

FGN	Federal Government of Nigeria
FIT	Feed-in-tariffs
FTE	Full-time equivalent
FY	Fiscal year
GABC	Global Alliance on Building and Construction
GBV	Gender-based violence
GCF	Green Climate Fund
GDC	Geothermal Development Company
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
GFMG	Global Facility for Mini Grids
GGDP	Global Geothermal Development Plan
GIF	Global Infrastructure Facility
GiZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GOGLA	Global Association for the Off-grid Solar Energy Industry
GoK	Government of Kenya
GoV	Government of Vietnam
GP	Global Practice
GRM	Grant Reporting and Monitoring
GWSP	Global Water Security and Sanitation Partnership
HCR	Host communities and refugees
HFCs	Hydrofluorocarbons
HSIP	Heating Sector Improvement Project
HUS	Housing and Utilities Subsidies program
IDA	International Development Association
IDB	Inter-American Development Bank
IDCOL	Infrastructure Development Company Limited
IEA	International Energy Agency
IFC	International Finance Corporation
IISD	International Institute for Sustainable Development
IMF	International Monetary Fund
IPP	Independent power project
IRENA	International Renewable Energy Agency
ISA	International Solar Alliance
JICA	Japan International Cooperation Agency
K-CEP	Kigali Cooling Efficiency Program
KNES	Kenya National Electrification Strategy
K-OSAP	Kenya Off-Grid Solar Access Project
KPLC	Kenya Power and Lighting Company
LAC	Latin America and the Caribbean
LNG	Liquefied natural gas

M&E	Monitoring and evaluation
MDTF	Multi-donor trust funds
MENA	Middle East and North Africa
MIGA	Multilateral Investment Guarantee Agency
MTF	Multi-Tier Framework
MTI	Macroeconomics Trade and Investment
MWp	Megawatts peak
NDC	Nationally Determined Contributions
NEP	National Electrification Program
NESAP	Niger Solar Access Project
NIGELEC	Niger State Utility
NLDC	National Load and Dispatch Centre
O&M	Operation and maintenance
OECD	Organisation for Economic Co-operation and Development
PDP	Power Development Plan
PFI	Private Finance Institution
PforR	Program for Results
PIU	Project implementation unit
PMA	Program management and administrative
PPA	Power purchase agreement
PPIAF	Public-Private Infrastructure Advisory Facility
PPP	Public private partnership
PSRP	Power Sector financial Recovery Program
PV	Photovoltaic
RE	Renewable Energy
REA	Rural Electrification Agency
REFF	Renewable Energy Financing Facility
REREC	Rural Electrification and Renewable Energy Corporation
RERED II	Rural Electrification and Renewable Energy Development project
RES	Rural Electrification Strategy
RFP	Request for proposal
RISE	Regulatory Indicators for Sustainable Development
SAR	South Asia Region
SCDs	Systematic Country Diagnostics
SDG	Sustainable Development Goal
SEAR	State of Electricity Access Report
SECO	Swiss State Secretariat for Economic Affairs
SEforALL	Sustainable Energy for All
SIDS	Small Island Developing States
SRMI	Solar Risk Mitigation Initiative
STEM	Science, technology, engineering, and math

TA	Technical assistance
TAG	Technical Advisory Group
TF	Trust fund
TOR	Terms of reference
TTL	Task team leader
UN DESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNSD	United Nations Statistics Division
USAID	United States Agency for International Development
VRE	Variable renewable energy
WBG	World Bank Group
WePOWER	Women in Power Sector Network in South Asia
WHO	World Health Organization
WING	Women in Geothermal

Executive Summary

Overview of ESMAP and the external evaluation

The Energy Sector Management Assistance Program (ESMAP) is a global knowledge and technical assistance program assisting low- and middle-income countries in growing their know-how and institutional capacity to formulate environmentally sustainable energy solutions for poverty reduction and economic growth. The multi-donor funded partnership program is administered by the World Bank, anchored in the Energy and Extractives (EEX) Global Practice (GP).

ESMAP's Fiscal Year (FY) FY2017-20 Business Plan aimed to "increase investment in Energy Access, Renewable Energy, and Energy Efficiency," and thereby contribute to the achievement of the Sustainable Development Goal 7 (SDG7) targets on affordable and clean energy for all. The program structure includes three thematic programs (energy access, renewable energy, and energy efficiency), three cross-cutting programs (regional annual block grants [ABGs], the Energy Subsidy Reform Facility [ESRF], and the Knowledge Hub), with gender integrated through the programs, rather than as a stand-alone initiative.

The external evaluation seeks to draw lessons from the operational processes and implementation of the FY2017-20 Business Plan, including the achievement of the intended results and the efficiency of operational processes. The conclusions and recommendations of the evaluation will be used for reflection, learning, and strategic adaptation of the program for the next business plan.

This evaluation adopted a mixed methods approach using both quantitative and qualitative analytical methods and tools. Data collection methods included document review, interviews with more than 250 stakeholders, and 12 country case studies, of which three were conducted in-person via one-week missions to Kenya, Niger, and Vietnam. The evaluation took a three-pronged analytical approach to better understand the pathways through which ESMAP is contributing to outcomes, impact, and the SDG7 goals. ESMAP was analyzed at the activity-level, country-level, and program-level and then synthesized across these levels. The evaluation was also overseen by a three-person Advisory Group.

Findings

Relevance

Relevance in the global energy landscape. Globally, ESMAP has been able to establish a global brand in the global energy access space, where it has extended its leadership from off-grid solar to mini-grids, and acts as the global convener and electricity access lead for SDG7. ESMAP is also stepping up its engagement and profile in the underfunded clean cooking sub-sector. In renewable energy, ESMAP international recognition is growing as a result of a number of flagship knowledge products and high-profile partnerships. ESMAP's global position is more focused on highly specialized products, such as the global solar and wind atlases and geothermal energy publications, and serving as a leader in flagship

initiatives in emerging technologies. In energy efficiency, ESMAP has not yet developed a global reputation, with its efforts instead predominantly Bank facing and linked to lending operations. ESMAP's leadership in energy subsidy reform, especially as an entity who is offering hands-on advice in countries, is recognized by other global organizations.

Relevance within the World Bank. Within the Bank, ESMAP has been particularly relevant in shifting the dominant electrification paradigm of grid-connected electrification to reflect the significant role of off-grid, mini-grids and clean cooking in bridging the energy access gap and scaling their deployment in lending operations. In renewable energy, ESMAP has filled critical gaps in resource data and in addressing technical challenges related to grid integration and providing transaction support. In energy efficiency, ESMAP has succeeded in making connections between energy efficiency and other priorities of different GPs and in broadening the geographical reach of energy efficiency.

ESMAP's funding, knowledge, tools, and expertise, and hands-on advisory and operational engagement function as mutually reinforcing modalities that are seen contributing to accelerating the alignment of the Bank's lending portfolio with SDG7. This contribution is helped by ESMAP's central position as the umbrella trust fund for the EEX GP, its internal reputation for technical excellence, and the revolving door between ESMAP and operational staff. A key finding is that ESMAP's continued relevance depends on its ability to engage with the broader processes of energy sector reform and sustainable energy transition, to ensure that sector weaknesses do not undermine energy access and clean energy objectives.

Relevance to country and regional priorities. Over the business period, ESMAP has adapted its programming to remain relevant to emerging technologies and client needs. New initiatives on energy storage, solar risk mitigation, and offshore wind, new business models such as public-private partnerships for mini-grids, and a new focus on financial viability of the power sector in low-income countries, have been taken up in response. The country case studies showed that, overall, ESMAP-funded activities are relevant and respond to clients' immediate and strategic needs, with examples of adaptive management to reflect changing priorities and circumstances. Country coordination is partially dependent on government preferences and capacity for coordination, and synergies between sector programs could be improved at the technical level.

Effectiveness and sustainability

Progress toward outcomes. Three-quarters through the business plan, ESMAP programs appear on track to achieve the Results Framework targets by the end of the period. Program-level progress reports have helped support accountability for reporting against the Results Framework. At the activity-level, more than four-fifths of intended outcomes were achieved or partially achieved in closed activities, and three-quarters of closed activities were likely to achieve sustainable outcomes. Progress toward outcomes related to development finance informed has been particularly strong, with a lower success rate for policy/strategy informed and client capacity increased.

A key area for further focus is quality of reporting in terms of ensuring that completion reports include outcome indicators, ABG grants clearly articulate how ESMAP outputs supported specific changes linked to lending operations, and outcomes rather than outputs are reported for country client capacity and knowledge indicators. The trend has been toward improvement.

Drivers of and barriers to effectiveness. The evaluation has shown that the way ESMAP works is critical for effectiveness. Key factors that are contributing to the effectiveness of ESMAP-funded activities are multiple and/or successive grants in a country and the coherence of ESMAP activities in a country (e.g., phasing of interventions, strategic linkages across thematic and cross-cutting programs, close linkages with WBG country strategies, taking a holistic or portfolio approach, and working across sectors and GPs). These factors point to the potential for programmatic engagement to drive results in the next business plan. Additional factors for effectiveness are ESMAP expert engagement with country teams and client governments (i.e., a more "hands on" approach and cross-support to operations), sharing experiences across regions, tailoring approaches to local circumstances, and maintaining cutting edge expertise that can be showcased with clients through technology- or solution-focused knowledge products. External factors that substantially influence the effectiveness of ESMAP-funded activities include political economy (including dynamics between energy-related agencies, such as Ministries of Energy, utilities, and regulators), market and regulatory environment, and government ownership and capacity.

Sustainability. These same factors also influence the sustainability of ESMAP-funded results, although sustainability is also closely linked to WBG lending operations, which are often used by ESMAP activities to ensure their benefits are continued after grant close. By designing project components, or providing data and analytics that underpin an operation, or advising on project implementation, ESMAP grants can leverage operations to support sustainability. Whether benefits continue, therefore, becomes a question of the quality of ESMAP's analytical and advisory services, as well as the overall success of the WBG operation. There has not been systematic follow up to examine the long-term effectiveness of this sustainability approach, and the country studies offered a limited view, given that many operations were just being implemented. Partnerships with other development partners and organizations were given limited attention in terms of helping to ensure sustainability.

Gender. ESMAP's strategic approach to gender (i.e., working through its regional gender and energy programs to embed specific actions to close gender gaps in EEX lending operations) has been more effective in this business plan than attempts to screen for and mainstream actions to address gender inequalities into individual ESMAP-funded activities. The regional gender and energy programs have achieved substantial results, informing actions to close gender gaps in more than half of the EEX GP energy lending. This has been done with relatively limited resources, representing less than two percent of ESMAP funding approvals in the business period. Challenges remain in terms of managing these limited resources against the growing need for both project design and implementation support, as well as ensuring that Board-approved projects allocate funding for gender actions embedded in the project components.

Knowledge. In the Knowledge Hub, ESMAP's partnership with the custodian agencies for SDG7 Tracking has shown that the transaction costs for joint knowledge production are high but the payoff is significant in terms of recognition and dissemination. RISE has been more outward facing, with more limited recognition or perceived applications among WBG operational teams and country clients. MTF has played an important dual role of supporting ESMAP's global leadership position in energy access and informing lending operations and policy outcomes at the country level. ESMAP has appropriately exercised adaptive management on SEAR. In terms of own-managed knowledge, the evaluation finds that flagship products and technology or topic-specific reports have been particularly influential with country clients. These products also serve to consolidate tacit knowledge in ESMAP staff, which is another key conduit of influence. ESMAP's knowledge products often occupy a unique space in the international energy landscape, with their focus on pragmatic lessons learned from operational experiences.

Theory of Change and Results Framework. ESMAP's Theory of Change for the FY2017-20 period presented a coherent narrative view of the pathway toward influencing development finance, but there is room for improvement in terms of the visual representation, as well as being much clearer about what are ESMAP inputs/activities and outputs, and how and under what assumptions these are expected to lead to outcomes and impacts. ESMAP knowledge and the pathway to influencing private finance are less well articulated in the Theory of Change, as are the linkages among the cross-cutting programs (ABG, ESRF, Knowledge Hub, and Gender) and thematic ones.

ESMAP's Results Framework was relevant and consistent with the objectives of the ESMAP programs and cross-cutting solutions, as presented in ESMAP's Theory of Change. But the progress to date suggests that the Results Framework targets for these outcomes could have been more ambitious. In a few cases, a core objective of a program—from the Theory of Change—was not well captured in the Results Framework; nor were the outcomes of the gender program represented in the Results Framework.

Impact

Development finance impact. ESMAP has succeeded in informing US$26.6 billion in WBG funding from FY2017-19, which represents a substantial proportion of the WBG commitments to energy access, renewable energy, and energy efficiency. In FY2018, for instance, the WBG committed US$1.4 billion to energy access,[1] of which two-thirds (US$930 million) was informed by ESMAP-funded activities. In FY2017-18, ESMAP informed nearly US$2.5 billion of WBG lending in renewable energy and energy efficiency.[2] Development policy lending operations represent a sizeable proportion of the WBG finance informed by ESMAP (one-third by lending volume), although these operations often cover prior actions

[1] World Bank. (2019). *Energy Results*. Available at: https://www.worldbank.org/en/topic/energy/overview#3. Updated October 11, 2019.

[2] Total WBG financing for renewable energy and energy efficiency for FY2014-18 was US$11.5 billion.

outside of the energy sector and thus the full amount reported may not contribute directly to SDG7. The country case study evidence largely validated the WBG development finance informed that is reported by ESMAP, with a few exceptions where timing or circumstances have changed.

Influence pathways for informing WBG finance include:

- In renewable energy, taking a multi-window approach to solar development, including combining variable renewable energy and solar support, or resource mapping and pre-feasibility studies to identify specific sites for development.
- In energy access, the combination of geospatial planning and multi-tier framework data leading to national electrification programs that the WBG has funded; in Lighting Global, designing loan facilities, consumer awareness campaigns, quality assurance frameworks in WBG projects; designing pilot initiatives for clean heating and cooking in WBG projects; and mini-grid portfolio planning and advising on PPP models.
- In energy efficiency, designing specific WBG project components (e.g., financing mechanisms, business models) and identifying energy efficient investments in other sectors, such as water, transport, and urban.

ESMAP also achieved some success in mobilizing further public and private finance. Private finance reported as informed by ESMAP (US$8.1 billion) has been primarily associated with WBG lending operations, with larger amounts often linked to private capital and commercial lending in renewable energy and energy efficiency projects. The non-WBG finance reported by ESMAP is likely to be an underestimate, since the country case studies provided examples where ESMAP support has mobilized parallel finance not included in ESMAP's operation-linked reporting or has contributed to outcomes that remove barriers to eventual private investment in sustainable energy.

SDG7 impact. Informing WBG lending operations is the primary pathway through which ESMAP contributes to its intended impact to ensure access to affordable, reliable, and sustainable modern energy for all (i.e., SDG7). Worldwide, the 76 million people expected to gain access to electricity through ESMAP-informed operations represent about nine percent of the unelectrified global population as of 2017. The country case study evidence shows that the degree of impact relative to SDG7 targets differs by country, with notable ESMAP contributions in Ethiopia, Rwanda, Kenya, Vietnam, and Niger. In Ethiopia, for example, ESMAP support led to WBG operations that could reduce the unelectrified population by more than 10 percent. In Niger, ESMAP support has led to a Government request for a Scaling Solar program that could shift the installed generation mix—which is currently all fossil fuel-based—toward one-fifth renewables.

Impact on poor and vulnerable peoples. ESMAP's impact on the poor and vulnerable is less clear. Few ESMAP-funded activities describe support focused on poor or vulnerable people, and ESMAP program progress reports also did not focus on these impacts. ECCH activities and ESRF grants focused on poverty and social impact analysis are surest in terms of these linkages.

Efficiency (governance and management)

Program cost-effectiveness. Program management and administrative costs have averaged 5 percent—a cost level that is lower than the previous business period and on par or lower than comparator MDTFs in the WBG. Key factors contributing to this cost-efficiency are: acting as an umbrella trust fund for the EEX GP, the provision of operational cross-support by ESMAP staff (keeping ESMAP staff costs down), and streamlining of operational processes, including the use of an automated online system for grant management. ESMAP also leverages Bank budget to achieve efficiencies, although the data are inconclusive on the extent of such cost-sharing arrangements. Still, ESMAP staff remain overstretched, as was noted in the previous independent evaluation, as new programs and initiatives have launched without associated staffing increases and as increased preferencing of donor contributions raises the management and reporting burden on ESMAP staff.

Operational efficiency. ESMAP is seen by EEX GP regional and task teams as agile, flexible, and quick compared to other trust funds. But operational teams felt that ESMAP grant proposal review processes were becoming more complex and longer over this business period. Operational teams also raised difficulties with the predictability of available ESMAP funding in the various windows, especially near the end of the business period.

Governance effectiveness. ESMAP's operating model is still effective, due in part to strong governance norms and pragmatic program management. The CG is an effective and appropriate governance model for ESMAP, as a multi-donor trust fund, and CG members feel that they are adequately consulted and heard by ESMAP management on the strategic direction of ESMAP. The TAG is seen by CG members and ESMAP management as having an important place in the ESMAP governance model, although the approaches taken to utilize the TAG during this business period have not met needs.

Emerging tensions. Over this business period, new donors and channels of contribution have surfaced, raising some areas to watch carefully over the next business period. One area relates to the balance of increased and increasingly specific preferencing of donor contributions, which requires more intensive management by the Secretariat, and the non-preferenced funding that is critical to allow ESMAP to implement its business plan with a margin of flexibility and meet emergent country client needs. Some CG members raised concerns over the transparency of reporting on preferenced contributions and how new ESMAP programs are funded. There are also concerns among CG members about membership norms rather than rules, which benchmarking shows that other similar programs have. CG members expressed some unease with the potential for members to influence the use of ESMAP funds, without contributing. So far, this has been pragmatically managed through closed sessions.

Another area to watch over the next business period is the emergence of more programmatic grants and ASA projects that put multiple activities under an umbrella to be flexibly managed. These programmatic activities offer some advantages for linking with WBG programming and adaptive management, and country case study evidence showed the potential for strong results, as in Ethiopia. However, programmatic activities also are likely to raise new challenges related to reporting and to the

potential to finance activities that are less impactful but also less noticeable, given the complexity of the overall activity.

Conclusions and recommendations

Based on its findings, the evaluation draws the following conclusions about ESMAP during its FY2017-20 business period:

- **Relevance:** ESMAP's interventions remain relevant in the context of the changed global landscape on energy, reflecting the goals of SDG7 and the Paris Agreement under the UNFCCC, and well-harmonized with emerging and existing global initiatives and institutions. ESMAP is seen as at the forefront of the sustainable energy transition, with its leading position globally and within the World Bank foremost acknowledged in the energy access agenda. ESMAP has influenced a substantial portion of the World Bank's lending in energy access, renewable energy, and energy efficiency.
- **Effectiveness and Sustainability:** Overall ESMAP-funded activities have made good progress toward achieving both project-specific outcomes and Results Framework outcomes, especially related to development finance informed. Multiple and/or successive grants in a country is a key factor affecting outcome achievement and sustainability. World Bank lending operations represent a key pathway for ensuring sustainability of ESMAP results.
- **Impact:** ESMAP has made substantial progress toward its mission to increase investment in energy access, renewable energy, and energy efficiency[3] three-quarters through its business plan. Through informing WBG lending operations, ESMAP has contributed to efforts that are expected to provide more than 76 million people with access to electricity, install 17.6 gigawatts of renewable energy, and result in 605 terawatt hours of projected lifetime energy and fuel savings—over 54 countries. ESMAP's impact on the poor and vulnerable is less straightforward to systematically discern.
- **Efficiency:** ESMAP has maintained its cost-effectiveness while experiencing significant growth. Benchmarking of the program management and administrative costs shows that ESMAP is being delivered at comparable levels of efficiency to other similar programs. ESMAP continues to be efficiently and effectively governed and managed, although there is broad consensus that the current TAG model has not worked well over this business period. Some tensions are also being to emerge in the governance model that may require future attention.

Recommendations

This evaluation team has provided evidence-driven recommendations for ways in which ESMAP could further improve the relevance, effectiveness, efficiency, impact, and sustainability of its programs and funded activities. A set of suggested specific actions accompanies each recommendation to enhance the

[3] As stated in ESMAP's Theory of Change for the FY2017-20 Business Plan.

utilization focus of the evaluation; these are summarized below, with more details given in the main evaluation report.

1. **Maintain and strengthen ESMAP's relevance and influence within the World Bank and globally.** Suggested actions include: (a) Continue the model of having ESMAP staff provide cross-support to operational teams; (b) Deepen engagement at the management level in the WBG to help drive change and interest for sustainable solutions, such as clean cooking, mini-grids, and energy efficiency; (c) Ensure that ESMAP remains engaged with the broader processes of the sustainable energy transition and energy sector reform; (d) In energy access, strengthen the focus on addressing affordability gap and consider continue to expand the focus to demand stimulation through productive uses and economic development; (e) In renewable energy, continue to link support with the broader issues of viable national utilities and competitive procurement and auctions, and continue to identify emerging technologies to provide knowledge leadership; (f) In energy efficiency, consider ESMAP's strategic positioning and potential opportunities to drive the agenda internally and possibly externally, and if the Energy Efficient Buildings program is continued, develop a more coherent strategy; (g) For ESRF, consider a practical learning approach to knowledge for next business period, as well as stocktaking of expansion into support for utilities in low-income countries; (h) sharpen the focus on the poor.
2. **Embrace the trend toward programmatic activities in the next business period, with consideration given to a set of priority countries in which substantial progress could be made toward SDG7.** Consider cohesive and successive grants on a country basis to drive results, including through programmatic activities. Given that ESMAP resources are limited, ESMAP management and the CG may also wish to consider a set of priority countries for the next business plan. These countries would offer an important learning opportunity for ESMAP, and TAG could play a role.
3. **Focus on a strategic approach to gender, a pragmatic approach to knowledge, and capacity building of national actors to support effectiveness.** Key areas of focus moving forward could be to ensure that actions to close gender gaps are funded through scaled support to the regional gender and energy programs and to ensure that budget is allocated in lending operations such that actions can be carried out during implementation on the client end. For own-managed knowledge, continue to focus on knowledge products that demonstrate the WBG's leadership in emerging technologies and financial, business, and delivery models, and leverage the WBG's hands-on operational experience. Ensure sufficient focus on capacity building of relevant national actors in the next business period to support outcomes, as well as sustainability of that capacity through operations. One area for increased capacity development is related to transfer of MTF skills.
4. **Rationalize ESMAP's theory of change and Results Framework for the next business plan and contextualize impact reporting.** On the Results Framework: (a) consider more ambitious targets for number of WBG operations informed in the next business plan; (b) include targets for the gender program; (c) reduce overlap in outcome targets; (d) ensure that the substance of the ESMAP program objectives are well-represented in the outcomes; and (e) ensure that the outcomes cover development finance informed, as well as policy/strategy informed and country capacity. On the theory of change, take a visual approach that better describes how ESMAP works and the outputs,

outcomes, and impacts it expects to achieve; better articulate the role of ESMAP knowledge in driving change, as well as risks, assumptions, and linkages among cross-cutting programs and thematic programs; and strengthen the narrative around private sector finance mobilized. On impact report, consider contextualizing ESMAP's impact relative to the WBG's relevant energy lending portfolio and SDG7 national, regional, and global targets.

5. **Proactively and pragmatically manage for emerging tensions in the ESMAP business model.** Suggested actions include: (a) Maintain ESMAP's flexibility and agility in the next business plan; (b) keep Regional Coordinators aware of the projected availability of resources in each window; (c) Maintain the cost-efficiency of ESMAP, while recognizing that the expansion of programs is not compatible with zero staff growth; (d) Ensure that ESMAP continues to receive a sizeable proportion of non-preferenced funding; (e) increase transparency in financial reporting around how new initiatives are funded; (f) Proactively manage the transition to more programmatic activities and multi-window activities.
6. **Define a new role for the TAG for the next business plan.** The role should recognize the purpose of the TAG, as reflected by CG members in interviews, to play an independent quality assurance function and serve as a strategic advisor, as well as the different skillsets that may be required for quality assurance versus strategic advice. Consider having the TAG do deeper assessments of ESMAP's relevance and results in specific thematic or cross-cutting areas, depending on the interests of the CG. The TAG could be staffed flexibly to meet these needs. As ESMAP moves toward more programmatic ASAs, the TAG could also play a role in ensuring value for money and progress toward impact.

1. Introduction

1.1. Objective and scope of the evaluation

The Energy Sector Management Assistance Program (ESMAP) was launched in 1983 as a global knowledge and technical assistance program assisting low- and middle-income countries in growing their know-how and institutional capacity to formulate environmentally sustainable energy solutions for poverty reduction and economic growth. The multi-donor funded partnership program is administered by the World Bank, anchored in the Energy and Extractives Global Practice (GP).

The objective of this external evaluation is to draw lessons from the operational processes and implementation of ESMAP's Fiscal Year (FY) 2017-20 Business Plan, including the achievement of the intended results and the efficiency of operational processes. The conclusions and recommendations of the evaluation will be used for reflection, learning, and strategic adaptation of the program for the next business plan.

The evaluation covers the ESMAP grants that were active from July 1, 2016 onwards (i.e., activities that were initiated in FY2017-19, as well as the activities from the previous FY2014-16 Business Plan that were ongoing or completed during the current Business Plan period), and goes through FY2019.

The ESMAP Program Secretariat and the Consultative Group (CG) are the primary users of the evaluation. Additional audiences include the World Bank's Energy and Extractives GP, in particular the Regional Coordinators and Task Team Leaders of ESMAP's grants, as well as country clients and partners, other multilateral and bilateral organizations, and the ESMAP Technical Advisory Group (TAG).

1.2. Methods

This evaluation followed a mixed methods approach using both quantitative and qualitative analytical methods and tools. Data collection and analysis methods included a thorough review and analysis of ESMAP documents and monitoring data and secondary literature, key informant interviews, and 12 country case studies, of which three were conducted in-person via one-week missions to Kenya, Niger, and Vietnam. The evaluation also took a three-pronged approach to better understand the pathways through which ESMAP is contributing to outcomes, impact, and the Sustainable Development Goal (SDG) 7 goals. ESMAP was analyzed at the activity-level, country-level, and program-level and then synthesized across these levels. Appendix A provides the sample of activities that were reviewed as part of the activity-level analysis. The Inception Report (July 2019) gives more detailed information on the evaluation methods and instrumentation. While the evaluation did not make any significant deviations from the approach set out in in the Inception Report, Appendix C provides more details on the analysis methods and reflections on the suitability of these methods and limitations of the evaluation.

More than 250 stakeholders were interviewed to inform this evaluation, including: CG members; ESMAP Secretariat staff; TAG members; World Bank Energy and Extractives GP managers, coordinators, and task

teams; World Bank Group (WBG) country management; WBG staff from other GPs and International Finance Corporation (IFC); international and regional organizations (e.g., Sustainable Energy for All [SEforALL], International Monetary Fund [IMF], International Institute for Sustainable Development [IISD], International Renewable Energy Agency [IRENA], Global Association for the Off-grid Solar Energy Industry [GOGLA], Africa Minigrid Developers Association [AMDA]) and multilateral and bilateral development partners (e.g., African Development Bank [AfDB], European Investment Bank [EIB], Japan International Cooperation Agency [JICA], French Development Agency [AFD], United States Agency for International Development [USAID], Deutsche Gesellschaft für Internationale Zusammenarbeit [GiZ], United Nations Development Programme [UNDP]); country client governments, and for in-person country visits, additional country stakeholders including local authorities, consultants, private sector, and civil society. Appendix B provides a list of all stakeholders interviewed.

The evaluation was also overseen by an Advisory Group, comprised of three members, including a representative of the CG, an independent Senior Energy Advisor, and a representative of the World Bank's Independent Evaluation Group. The purpose of the Advisory Group was to review the inception and draft reports and be available to answer queries from ICF to ensure the transparency and independence of the evaluation. ICF held monthly status update calls with the Advisory Group members and benefitted from their insightful questions and advice.

1.3. Structure of the report

The remainder of this report is structured as follows:

- **Chapter 2** provides background on ESMAP during its FY2017-20 business period.
- **Chapter 3** assesses ESMAP's relevance in the global context, in the World Bank, and in relation to country and regional needs and priorities. It answers key questions related to whether ESMAP's interventions are relevant and evolving to reflect the changed global landscape on energy, the extent to which ESMAP influences the work of the WBG and other development partners, and how relevant ESMAP activities are to the needs of country and regional clients.
- **Chapter 4** analyzes the effectiveness and sustainability of ESMAP-supported activities. It answers key questions related to the extent to which ESMAP-funded activities and programs achieve the Results Framework and project-specific intended outcomes. It also addresses the extent to which ESMAP activities incorporate gender issues and the contributions of the fully integrated gender program to closing gender gaps. Importantly, this chapter also provides a synthesis of key drivers and barriers influencing the achievement and non-achievement of ESMAP outcomes.
- **Chapter 5** considers ESMAP's progress toward impact in terms of mobilizing development finance (including private finance), and in terms of energy access, renewable energy, and energy efficiency (SDG7). This section also considers impacts for the poor and vulnerable peoples, including women.
- **Chapter 6** addresses governance and management issues. It answers key questions related to the efficiency and cost-effectiveness of ESMAP programs, and the efficiency and effectiveness of ESMAP's governance structure, including the role of TAG and the CG. It also reviews operational

processes that affect progress toward results and assesses the extent to which ESMAP has acted on recommendations from the previous evaluation. Finally, this section considers the extent to which the Results Framework is relevant, coherent, and consistent.

- **Chapter 7** presents the evidence-based conclusions and recommendations.

The Appendices provide additional detail and information to support the evaluation. Appendix A provides the list of ESMAP activities reviewed by the evaluation in the activity-level sample. Appendix B contains a full list of stakeholders interviewed during the evaluation. Appendix C gives additional detail on the evaluation analysis methods and their suitability. Finally, Appendix D offers more information on the relevance of ESMAP by region.

2. Background on ESMAP and the FY2017-20 Business Plan

Since FY2012, ESMAP has conducted more than 500 activities in over 130 countries, and 292 activities have been approved in the period since FY2017 to today. The current active portfolio includes 239 grants, and 87 grants approved during the business plan (starting in FY2017) have closed.

ESMAP's work program is primarily delivered through grants to the World Bank's regional energy units, integrated within the World Bank Group's (WBG) country policy dialogue and lending programs in the energy sector (see also Box 2-1 below on ESMAP and the World Bank). This funding includes annual block grants (ABGs) for each region (using a performance-based formula) and global programs dedicated to thematic priorities in the ESMAP Business Plan.

ESMAP's FY17-20 Business Plan reflects major developments in the sustainable energy strategic global context, compared to when the previous Business Plan was approved for FY14-16. In 2015 countries adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs), including SDG7 on access to affordable, reliable, sustainable, and modern energy for all by 2030. In 2016, the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC) entered into force, with major implications for the energy sector. Developed and developing countries agreed to nationally determined contributions (NDCs), with half of NDCs including energy sector targets and more with energy-related actions for end-uses, such as those in cities and buildings, clean cooking, and transport. The WBG's Climate Action Plan sets ambitious targets for ESMAP's host organization, and ESMAP has a role to play in shaping strategies and programs to achieve those targets (see also Box below).

ESMAP's FY17-20 strategy aims to "increase investment in Energy Access, Renewable Energy, and Energy Efficiency," and thereby contribute to the achievement of the SDG7 targets to: ensure universal access to affordable reliable and modern energy services; increase substantially the share of renewable energy in the global energy mix; and double the global rate of improvements in energy efficiency. A Theory of Change and Results Framework further set out the pathways for achieving this objective. The program structure includes:

- Three cross-cutting programs: ABGs for governance, markets, and planning; Energy Subsidy Reform and Delivery technical assistance facility; and the Knowledge Hub.
- Three thematic programs: energy access (EA); renewable energy (RE); and energy efficiency (EE), as well as priority programs and facilities within these themes.
- Integrating gender throughout the programs, rather than as a stand-alone initiative.

To oversee the implementation of this Business Plan, ESMAP is governed by a CG of donors, which is also tasked with providing strategic guidance to ESMAP on global thematic challenges and approving overall budget allocations. ESMAP's three-member TAG provides independent assessment and recommendations on the strategic direction and priorities of the program—reporting directly to the CG.

ESMAP's Program Secretariat, located in the World Bank, is responsible for day-to-day operational management. The Secretariat is led by a Program Manager (part of the Energy & Extractives Global Practice Management Team), with a team of approximately 40 staff. As a WBG multi-donor trust funds (MDTF), ESMAP follows the Bank's rules, policies, and procedures in executing its programs. The Secretariat is also responsible for activities such as monitoring, reporting, and evaluation, knowledge management, and communications.

ESMAP is the umbrella MDTF for channeling donor funding to the EEX GP, with new avenues of funding expanding its business model in this capacity. This position is further explored in Section 6.2 of this report.

Box 2-1: ESMAP as an MDTF in the World Bank Group

Since the evaluation of ESMAP's previous business period (FY2014-16), there have been significant changes inside the World Bank. In 2013, the WBG adopted a new strategy that introduced two goals: to end extreme poverty by 2030 and to promote shared prosperity for the bottom 40 percent of the population in every country. The Bank also underwent a reorganization to build a new operating model to help meet these goals; this process created Global Practices, including the Energy & Extractives GP that hosts ESMAP. The WBG's Energy Sector Directions Paper was released in 2013. IDA18 was finalized in December 2016 to finance projects through FY2020. The WBG's Maximizing Finance for Development agenda also provides important context for ESMAP as it supports SDG7.

The WBG has also made ambitious commitments to: increase the climate-related share of its portfolio from 21 to 28 percent by 2020; scale up 20 GW in renewable energy generation and integrate an additional 10 GW of variable renewable energy sources into grids over 5 years; mobilize $25 billion in commercial funds for clean energy; invest at least $1 billion to promote energy efficiency and resilient buildings by 2020; and increase support to policy actions for sector reform, including fossil fuel subsidies reform. The WBG's Climate Change Action Plan (2016-2020) recognizes the need for sustained, ongoing access to trust fund resources, including those coming from ESMAP to help meet these goals. The World Bank has significantly increased its support for energy access and the transition to clean energy over the past several years, with $5 billion committed for energy access and $11.5 billion for renewable energy and energy efficiency financing in FY2014-18.

In addition to these strategy and organizational advances, the environment for MDTFs has also evolved since the last evaluation of ESMAP. Over the past several years, the WBG has been undergoing trust fund reforms aimed at strengthening the link between funding and strategic priorities, and at improving efficiencies. Some efforts have been made to consolidate trust funds within the GPs, such as merging ASTAE into ESMAP. Trust funds have also been integrated into the main WBG operational platform.

3. Relevance

This section discusses the findings on ESMAP's relevance in the global landscape on sustainable energy and climate change, to the WBG and especially the Energy and Extractives GP, and to regional and country priorities in the energy sector. The findings on relevance are triangulated across evidence from interviews with more than 100 WBG operational and management staff, as well as country clients, development partners, and other international organizations and experts working in the energy sector. These findings were further contextualized in trends in global sustainable energy and in the WBG's strategy and commitments to sustainable energy and climate change investment over the business plan period. The findings are further supported by the evidence from the three ESMAP program deep dives, which took a more detailed look at the relevance position of the mini-grids, energy efficient buildings, and energy subsidy reform programs (see also Section 4.4).

Overall, the relevance findings confirm ESMAP's unique comparative advantage derived from its position within the World Bank, as described in the Theory of Change for this Business Plan. This position has enabled ESMAP to take a global leadership position in the sustainable energy space (with a stronger position in energy access, as discussed below), to influence WBG dialogue and lending, and to draw on experience worldwide to inform knowledge products and technical assistance. Critical in sustaining its relevance is ESMAP's technical excellence and its ability to recruit and retain high caliber experts resulting in cutting edge knowledge, its cross-support to operations, its wide range of upstream and downstream support modalities, and its flexibility to respond to clients' immediate and strategic needs, including at the regional level.

3.1. Relevance in the global energy landscape

The challenges to ensuring access to affordable, reliable, sustainable and modern energy for all are immense. While the global population without access to electricity fell from about 1.2 billion in 2010 to around 840 million in 2017,[4] serving the remainder of the unelectrified population will require extraordinary efforts and financing. The global challenge for access to clean cooking remains immense; just under 3 billion people lack access to clean fuels and technologies for cooking. Renewable energy has seen impressive growth and cost reductions but needs to accelerate to meet SDG targets. Despite having the potential of delivering 40 percent of the emission reductions required to meet global climate goal, the rate of energy efficiency improvement slowed in 2018, putting climate targets at risk.[5]

ESMAP is at the vanguard of the sustainable energy transition, globally and within the WBG. This position is supported by its role as the knowledge hub for SDG7, the developer of ground-breaking tracking tools like the Multi-Tier Framework (MTF) and Regulatory Indicators for Sustainable Energy

[4] United Nations. (2019). *SDG7 High-Political Forum 2019.* Retrieved from Sustainable Development Goals Knowledge Platform: https://sustainabledevelopment.un.org/content/documents/24660SDG_7_Update_HLPF_2019.pdf.

[5] International Energy Agency. (2019). *Energy Efficiency 2019.* International Energy Agency.

(RISE), the author of internationally recognized knowledge products such as the global solar and wind atlases and geothermal energy publications, and as a leader in flagship initiatives in energy storage and solar and wind energy that have raised significant amounts of concessional financing through partnerships with the Climate Investment Funds (CIF), Green Climate Fund (GCF), and others. Interview partners from international energy-related organizations and WBG staff recognize ESMAP as a producer of global public goods, generating high quality, credible evidence and data that have helped a broad range of international and national actors navigate the transition towards universal access to sustainable energy. ESMAP is equally recognized for its role in shaping high profile partnerships in energy access and renewable energy that are harnessing WBG concessional resources and wider influence through policy and country dialogue at the highest level in the energy sector.

ESMAP has evolved from co-leading the Global Tracking Framework into a global convener, secretariat, and electricity access lead for Tracking SDG7. As secretariat, ESMAP serves as a channel and fund manager for donor funding for the other custodian agencies (i.e., International Energy Agency [IEA], IRENA, WHO). Tracking SDG7 draws on and is complemented by ESMAP's MTF, a primary source of data on energy access, and RISE, a suite of indicators that assesses the regulatory environment for access and clean energy. The MTF in particular is seen by development partners and governments as a critical new tool for tracking progress and informing policy and investment.

ESMAP's leading position is foremost acknowledged in the energy access agenda. At an operational level, ESMAP's support for Lighting Africa and Lighting Global has helped drive a growing market in off-grid solar products that have reached 165 million people in 28 countries in Africa, Asia and Latin America and the Caribbean.[6] Its global role in energy access has been bolstered by international and regional events organized or co-financed by ESMAP, which have brought mini-grids and stand-alone systems to the attention of governments, rural electrification agencies, and DFIs. Moreover, through its support for solar off-grid ecosystem builders like GOGLA and AMDA, ESMAP has helped to foster an entrepreneurial ecosystem around off-grid solar and mini-grids in developing countries. According to external and WBG interviewees, ESMAP has played a critical role in creating a growing off-grid electricity community of government, private sector, non-profit, and international stakeholders. Among this community, interview partners believe that ESMAP has helped raise awareness and share knowledge around different business and financing models and enabling policies and regulation for mini-grids.

ESMAP is also stepping up its engagement and profile in the underfunded clean cooking sub-sector. ESMAP has played a role in raising the level of political consideration of this sub-sector, through its joint support for the *Policy Brief #2 on Achieving Universal Access to Clean and Modern Cooking Fuels, Technologies and Services*, which was considered at the first SDG7 review at the UN High-level Political Forum in 2018. In September 2019 ESMAP also launched a WBG US$500 million Clean Cooking fund, which will leverage investments from multilateral development banks and support a global platform for knowledge and innovation, including the Health and Energy Platform for Action. The latter is being

[6] Energy Sector Management Assistance Program. (2018). *Annual Report 2018*. World Bank Group.

convened by World Health Organization (WHO), United Nations Development Programme (UNDP), United Nations Department of Economic and Social Affairs (UN DESA) and the World Bank as well as other stakeholders such as Hivos, Energia, and Modern Energy Cooking Services Programme. Interviewees are hopeful that the EEX GP will adopt an access target for cooking as part of IDA19. Also recently, the ESMAP team together with the Loughborough University conceptualized and launched the modern energy cooking services program with about £40 million funding support from DFID. The program has received an A+ rating from DFID's external evaluation.

In renewable energy, ESMAP's global position is more focused on highly specialized products and initiatives, given that entities like IRENA and IEA are playing leading roles in advancing knowledge and producing data, including leading on renewable energy statistics for Tracking SDG7. In addition to producing the much-praised Global Solar Atlas and Global Wind Atlas, ESMAP is at the frontier of promoting new technology (e.g., energy storage, floating solar) and new delivery and financing models. A major success in terms of influencing the WBG in this business period has been around energy storage. ESMAP led the development of a US$1 billion Accelerating Battery Storage for Development program, in collaboration with the EEX GP's Climate Finance team, which was launched by the WBG in September 2018. The initiative was followed in 2019 by a high-profile Energy Storage Partnership (ESP) convened by the WBG and hosted by ESMAP, comprising the WBG and 30 organizations working together to help develop energy storage solutions tailored to the needs of developing countries. The initiative was modeled on the successful approach taken to raise concessional finance for geothermal with the Clean Technology Fund (CTF) (see below). Energy storage is now a target in the WBG's Climate Change Action Plan and is in the IDA19 policy commitments to enable the financing of five GW hours of battery storage. Another new cutting-edge technology initiative led by ESMAP in partnership with IFC will support offshore wind development in emerging markets, for which initial analyses of technical potential were published in October 2019.[7] These developments are testaments to ESMAP's influence through knowledge leadership, engaging in emerging topics, and building support at the highest levels to ensure that sufficient financing and resources are channeled to identified needs.

Another renewable energy initiative with global recognition by international interview partners is the Solar Risk Mitigation Initiative (SRMI), developed by ESMAP in partnership with AFD, IRENA, and the International Solar Alliance (ISA). The core objective of the SRMI is to support a sustainable scale-up of solar and wind by mobilizing private investments using a combination of limited public financing, technical assistance and risk mitigation instruments.

Another sub-sector where ESMAP has spurred a shift is in geothermal energy, through its Global Geothermal Development Plan (GGDP), an ESMAP-led partner initiative that has raised concessional funding at scale from the CTF for the riskier phases of geothermal development (e.g., exploration). Funding raised stands at US$235 million, and projects currently underway are expected to mobilize an additional US$1.5 billion from other sources. In FY19, a further US$100 million of GCF funding and

[7] World Bank. (2019). *Going Global. Expanding offshore wind to emerging markets.* October 2019.

US$75 million of CTF funding was raised for a geothermal project in Indonesia. Interviews with WBG operational staff and management indicated that the depth of technical expertise of ESMAP staff on geothermal development was especially critical for changing the Bank's approach and beginning to scale up finance.

In energy efficiency, the leadership of the World Bank at the global level is less evident and ESMAP has not yet developed a global reputation in this area, according to interviews with external international organizations as well as World Bank staff**.** Instead, ESMAP's efforts have been predominantly Bank facing and linked to lending operations. In the WBG, ESMAP has made progress in establishing connections between energy efficiency and priorities in different sectors/GPs, which is reflected in growing lending for energy efficiency outside the Energy & Extractives (EEX) GP (e.g., in the Water, Transport, and Urban GPs). The lower profile of energy efficiency in the World Bank reflects in part the fragmented nature of the sector, its lack of visibility and clear focus compared to renewable energy for example, and the high transaction costs associated with lending for energy efficiency. It also reflects the lack of capacity and interest of governments, as evidenced in the very low numbers of Nationally Determined Contributions (NDCs) with specific energy efficiency commitments. In the energy efficiency space, ESMAP is more of a joiner than a leader. For example, to counteract the slowing rate of energy efficiency improvements, the Three Percent Club was launched under the Climate Action Summit's Energy Transition Track in September 2019. It is a coalition of 15 countries, and businesses and institutions committed to energy efficiency through ambitious policy measures. The Three Percent Club comprises the European Bank for Reconstruction and Development (EBRD), IEA, Global Environmental Facility (GEF), SEforALL Energy Efficiency Accelerators and Hub, and Energy Efficiency Global Alliance among others. ESMAP, on behalf of the World Bank, has recently joined the group. A more in-depth evaluation of an ESMAP energy efficiency program is presented in 4.4.2 on the deep dive of Efficient and Sustainable Buildings.

An emerging area in energy efficiency that has recently benefited from international attention is energy efficient cooling. Building on the momentum of the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, which phases out high global warming potential hydrofluorocarbons (HFCs), 17 donors launched the Kigali Cooling Efficiency Program (K-CEP) to help developing countries transition to energy-efficient, climate-friendly, and affordable cooling solutions. K-CEP has partnered with ESMAP to establish the Efficient, Clean Cooling Program (ECCP) as a new business line under ESMAP's Efficient and Sustainable Building Program, in co-management with the World Bank's Montreal Protocol Team. ESMAP was selected as partner on the basis of its capacity to champion and institutionalize the efficient cooling agenda, to raise funding, and to coordinate with the Bank's Montreal Protocol Unit.

ESMAP's Energy Subsidy Reform Facility (ESRF) is seen as a global convener and knowledge champion for fossil fuel subsidy reform by other international organizations who undertake research and analysis or advocacy on the topic. The ESRF acts as a hub and coordinator for organizations such as the IMF, Organisation for Economic Cooperation and Development (OECD), Global Subsidies Initiative, IEA, and the Friends of Fossil Fuel Subsidy Reform.

Overall, ESMAP has established a global brand in the sustainable energy space, particularly in energy access, and a lesser but growing recognition in renewable energy where it has been able to leverage the Bank's ability to fundraise concessional climate funds for new initiatives. It is still largely unseen in energy efficiency in the international landscape, despite having made steady progress in integrating energy efficiency considerations in Bank projects and in helping to develop delivery models and financing mechanisms. At the frontier, issues on the horizon like e-mobility, green industrial decarbonization, green hydrogen, fuel cells, and digitalization and their relevance and impact on the sector are being discussed by ESMAP for consideration in the next business plan. Its mandate, ability to form partnerships, and flexibility puts ESMAP in a strong position to push the knowledge frontier in the energy sector.

3.2. Relevance in the World Bank Group

Within the World Bank, ESMAP has strengthened its business model over the past few years, working through World Bank country teams to provide technical assistance and knowledge at the country level, to support the WBG objective of assisting its client countries in securing affordable, reliable, and sustainable energy supply, and achieving the WBG's Climate Change Action Plan targets. ESMAP is integrated with the Bank's country policy dialogue and lending programs and has maintained the flexibility to allocate funding into fairly predictable funding envelopes for regional teams, although available funding cannot meet all demand.

ESMAP is unanimously viewed by World Bank staff as an indispensable source of cutting-edge knowledge, deep expertise, and grant funding for upstream and lending-linked analytical work that has influenced country policy dialogue and lending operations. While most of its work is found to be demand driven, demand itself has been shaped by ESMAP's influence on global thinking, by its knowledge products and events, and by the availability of funding for new tools for data collection, analysis and modeling.[8] Interviews suggest that the existence of the thematic and cross-cutting windows by itself has shaped operations, although the level of influence differs among the windows (as discussed further below). ESMAP also functions as a conduit for new technologies, like battery storage, floating solar and offshore wind, and new thinking and delivery models, such as in clean cooking. This is seen as a critical role by operational staff and management. ESMAP's role for both upstream and downstream TA is seen as critical by WBG operational staff, although **some interviewees raised the issue of balance between ESMAP's support for work linked to specific lending operations versus policy dialogue**, noting

[8] Specific evidence of the role of ESMAP's global and regional knowledge products is provided in the three ESMAP program evaluations (Section 4.4, the country case studies (Section 4.1.2), and the assessment of ESMAP's knowledge approach (Section 4.3), as well as the regional relevance sub-section below.

the critical importance of the latter and the low volume of energy-related lending in certain regions (see **Error! Reference source not found.** and also Section 3.3 below).

BOX 3-1: RELEVANCE OF UPSTREAM VERSUS DOWNSTREAM TA

ESMAP's relevance does not always translate into immediate results because upstream work takes time; it can take a few years to shift a dialogue and often involves utility and regulator capacity building. Furthermore, upstream support for continued dialogue during lending "down years" and in fragile countries without a lending portfolio are seen as important by WBG interviewees for ESMAP and the Bank's readiness for future lending.

While the EEX GP views ESMAP's support for upstream TA as essential, ESMAP is also increasingly involved in project design and even implementation through the provision of staff time and other forms of 'cross-support'. Whereas ESMAP cannot be involved in every relevant project, there are sometimes complex or new design issues for which there is no capacity in task teams or country offices that justify ESMAP input during implementation. The country case studies found **that deep ESMAP staff and consultant involvement in project design and implementation leads to better designed mini grid and off-grid solar projects**. In both type of projects, the difference between successful and poor design and impact often comes down to highly context-specific design and implementation support during at least the first stages of implementation because of the lack of familiarity of Bank staff with these types of projects, and the absence of standardized contracts in RBF or PPP approaches. **Until the delivery models for off-grid solar and mini grids and contextual factors are better understood and road-tested in a variety of countries and political economies, ESMAP's embeddedness in design and implementation stages is both warranted and impactful.** ESMAP's staff involvement in country operations also benefits the relevance of ESMAP's expertise by being confronted with live issues and on the ground complexities. The evolution of ESMAP, of embedding its staff in project task teams, as a more operationally integrated entity has been found quite useful.

ESMAP's funding, tools, and expertise, hands-on advisory, and operational engagement function as mutually reinforcing modalities that are enabling the transition in the Bank's energy sector lending operations. Overall, senior management in the EEX GP see ESMAP as having contributed to accelerating the alignment of the Bank's lending portfolio with SDG7. More detail on the influence of specific ESMAP themes and programs in mainstreaming technologies and approaches into Bank lending is provided later in this section, as well as in Section 4.4.

Underpinning ESMAP's relevance at a foundational level is its technical excellence and its ability to recruit and retain key experts, including its Program Manager. The facts that ESMAP has had the same Program Manager for many years, who is also part of the GP management team, and that ESMAP can retain its experts are signals of its strong position in the EEX GP. Further signals of ESMAP's influence are its role as an incubator for operational staff, who may then hold influential roles within the GP (e.g., several Regional Practice Managers are ESMAP alumni), and the fact that operational staff also rotate back into ESMAP to build expertise. The importance for the Bank of having access to high caliber specialists and deep expertise in ESMAP was also stressed in interviews with WBG staff, as well as the need for ESMAP to invest more in such experts.

Compared to some other MDTFs in the Bank, ESMAP's Program Manager is more influentially located in the management structure of the EEX GP. ESMAP's management positioning has helped to raise issues such as clean cooking on the Bank's agenda, although some interviewees felt more could be done to engage with GP management and influence the Bank. Change and awareness of new models and new paradigms often come from the top, although relationships between ESMAP and Bank teams are also

Identified as important institutional carriers of change, in particular in terms of identifying and directly supporting lending operations.

ESMAP's influence within the WBG is further supported by its partnerships with other GPs, cross-cutting areas, and IFC. Cross-GP collaboration has been especially effective when initiatives are jointly managed by ESMAP and another GP, such as the co-leadership of the ESRF with the Macroeconomics, Trade, and Investment GP, or of the MTF with the Poverty GP. (See Section 4.4 for a deeper look at partnerships in ESMAP programs.) ESMAP's linkages with climate finance in the Bank—supported by the ESMAP's Program Manager leadership of this team—have also been instrumental in ensuring the relevance of ESMAP activities to concessional climate finance. The best example of its strategic role in this regard is in geothermal energy where its partnership with the CTF has led to hundreds of millions of concessional climate finance; as noted above, ESMAP is now replicating this model with energy storage. Efforts are also underway to access GCF funding for clean cooking, with one clean cookstove project in Bangladesh already approved, and with more in the pipeline. Additionally, GCF has asked ESMAP to develop a GCF facility to channel concessional climate funds through SRMI.

BOX 3-2: ESMAP COLLABORATION WITH IFC

ESMAP's collaboration with IFC is primarily managed at the program or technical level; numerous IFC interviewees described the collaboration as "relationship-based" or a "relationship-focused partnership," meaning that it is managed through personal relationships rather than institutionalized. One major reason for this is that organizationally IFC does not have a clear counterpart for ESMAP to engage with at a management level. This is a WBG structural constraint that is seen to be beyond the ability of an MDTF such as ESMAP to influence.

IFC interviewees perceived ESMAP as collaborating well within these institutional constraints, with natural connections between ESMAP and IFC's Industry Specialists who benefit from ESMAP's products (e.g., renewable resource mapping) and expertise. Interviewees did not see any significant impacts to the collaboration with ESMAP so far as a result of recent IFC reorganizations (including the dissolution of IFC's Energy Advisory group) or of the WBG's cascade strategy.

At the program level, ESMAP has continued its long-standing collaboration with IFC on Lighting Global, collaborated on the IFC Excellence in Design for Greater Efficiencies (EDGE) Program, and launched the Offshore Wind program as a partnership co-managed with IFC, among other efforts. On Lighting Global, both World Bank and IFC interviewees indicated good trust and regular communication between ESMAP and IFC, whose roles are seen as complementary by interviewees. In the words of one interviewee:

> *"We are not always working in the same countries but at the regional level we have the same objectives and are able to bring different kinds of tools and instruments and people to bear. The complementarity of [IFC] working hand-in-glove with companies and the Bank working with government really creates this complementarity, which is unusual in WBG operations. This has been sustained despite personnel changes on the Bank side."*

In the country studies, this Lighting Global complementarity was observed in Kenya, where IFC was involved in the World Bank off-grid project design. This complementarity can also be seen where IFC is leading on quality assurance and supply chain development, and the Bank leading on policy such as government adoption of standards.

Other prominent linkages with IFC in country studies were through EDGE and the Scaling Solar program. In Bangladesh and Niger, for example, ESMAP support has helped lead to government requests to IFC Scaling Solar. In Niger, where an ESMAP-funded pre-feasibility study empowered the Government to request IFC Advisory Services to support private development of up to 60 MW of solar power. At the individual grant level, less than 5 percent of the task team leaders in the evaluation's activity-level sample were from IFC.

ESMAP's influence on the Bank varies by thematic and cross-cutting window, given different Bank-related and in-country constraining and enabling factors that are specific to each sub-sector. For instance, the dominant paradigm within the Bank and in most countries has been rural electrification through grid extension, despite the higher connection costs compared to mini-grids and despite the negative impact on the balance sheet of state utilities. This is because there is a long-standing institutional framework for pushing out large grid-connected electrification projects. There is no such framework yet for electrification through mini-grids. As a result, most mini-grid lending initiatives are still pilots in which different ownership and business models and subsidy frameworks are being tested. (Section 4.4 provides a deeper look at the range of tools that ESMAP is using to support mainstreaming of mini-grids, the dynamics of Bank and client readiness for such mainstreaming, and the amount of WBG financing that has been mobilized since the start of ESMAP's mini-grids program.)

Similarly, efficient and clean cooking and heating tends to be a smaller component of a larger lending operation, and interviewees indicated that because cooking components are perceived as "hard"[9] by task teams, these components are sometimes dropped during project concept review, with the intention to simplify. The ESMAP program is still in a position of seeking to create demand among task teams. Over the course of the past three years, however, World Bank interviewees saw clean cooking grow in importance. Cross-sectoral collaboration has significantly increased, led by ESMAP and involving Health, Gender, and Climate, and supported by senior management up to the Managing Director level. Collaboration with the Health GP has now been formalized at the level of the Global Directors.

Progress is also demonstrated by the first IDA projects coming forward with significant components for clean cooking access (e.g., in Bangladesh, Zambia, Uganda). Interviewees noted that the new clean cooking fund can serve as an incentive for new operations across GPs. Several factors are perceived as contributing to this momentum. One is the growing awareness of clean cooking access as a significantly lagging target under SDG7, as has been supported by ESMAP's contribution to a Policy Note on this subject and socialization in high-level political forum. Another factor is the efforts by the ESMAP team and staff in other GPs to convince management of the importance of clean cooking.

[9] In the sense that there are high transaction costs involved with working at the household level compared to the low lending volumes mobilized.

In contrast, and despite significant risk and capacity barriers, utility-scale solar fits within the dominant paradigm of large-scale centralized energy generation. Furthermore, the sector permits scaling using a specific delivery model that can be replicated anywhere, although with some adjustment. As a result, large scale solar can benefit from WBG flagship initiatives, namely the SRMI[10] and joint WBG-IFC Scaling Solar initiative, both of which aim to scale concessional financing and unlock large amounts of private financing. **In this context, ESMAP's relevance lies in its capacity to address resource data gaps through mapping and technical challenges related to grid integration through its VRE program, and in its critical pre-feasibilities and transaction support under the solar window.** For the SRMI, ESMAP's role is to provide technical assistance, with the World Bank and other DFIs providing concessional financing and risk mitigation instruments.

BOX 3-3: EXAMPLE OF AN INFLUENCE PATHWAY

One way of influencing new approaches in the Bank is a successful technology deployment or business model at scale linked to a lending operation in a region. This is particularly the case for grid-scale solar energy and solar stand-alone systems where successful scaling in specific countries and markets is driving other countries' demand for replication. For example, the success of grid-scale solar in India in combination with the potential for solar energy in Pakistan identified in the Global Solar Atlas has helped build Pakistan's interest in grid-scale solar. Similarly, the success of the SHS market in Eastern Africa in combination with international events, knowledge products and technical assistance (TA) under Lighting Africa is spurring West African governments to replicate the creation of a SHS market in the region through the Regional Off-Grid Electrification Project (ROGEP).

Stand-alone solar has similarly gained from a single delivery model under Lighting Africa and Lighting Global: namely, that of building commercial markets for the manufacture and sale of quality solar lanterns, and subsequently for higher tier stand-alone solar systems. **ESMAP played a key role by providing a wide range of technical and market studies, and support for the design and implementation of off-grid solar projects. However, there are limitations to the model, which are recognized in the latest *Off-Grid Solar Market Trends* report**.[11] As companies are exhausting low-hanging fruit in major markets having mainly served customers under the wire and closer to cities that have higher spending power, closing the remaining gap and serving harder to reach and poorer segments of the population will require new thinking and delivery models. These limitations also became apparent in the evaluation of ESMAP's support in Niger as explained in Box 4-3 in the next chapter.

In energy efficiency, ESMAP made progress in helping make connections between energy efficiency and priorities of different sectors/GPs and highlighting synergies with other objectives. ESMAP has helped to find different entry points to broaden the Bank's energy efficiency engagements, and for

[10] In the short-term (FY20), SRMI is supporting four national projects in Burkina Faso, Maldives, Uganda, and Zanzibar and a regional West Africa project representing US$1 billion of public investments to access US$260 million of climate finance. The projects are unlocking around 900 MW of privately-financed solar generation, 600 MWh of storage, mobilizing US$1.3 billion of private investments and providing access to affordable and clean electricity to around 5 million people. In the medium-term, SRMI is expected to unlock 7 GW of variable renewable energy (VRE) (directly supported) in 15 pilot countries mobilizing US$6 billion in private investments and supporting the integration of another 30 GW of VRE.

[11] World Bank Group. (2018). *Off-Grid Solar Market Trends Report 2018. Executive Summary.* International Finance Corporation.

example facilitated the integration of energy efficiency in the Water GP through the development of screening tools and supporting some audits to better identify EE opportunities in water operations. ESMAP has also facilitated and supported the integration of energy efficiency considerations in urban development and regeneration, as well as housing agendas (e.g., China, Argentina, Cote d'Ivoire, as well as through the analytical work on the auction for green buildings which is focusing on housing), as well as linking efficiency with key agendas such as resilience (e.g., Kyrgyzstan). Within the energy sector, ESMAP is helping broaden the reach of energy efficiency in Africa and has started to forge important linkages with the agenda of energy subsidy reform (with a start in Serbia).

ESMAP's relevance is also bound up in its ability to engage with the broader processes of energy sector reform and sustainable energy transition. WBG interviewees expressed the view that for ESMAP to remain relevant to client country needs, it should not be perceived as "just" a renewable energy, energy efficiency, and decentralized access program. **Interviewees believed that for ESMAP to support a sustainable energy transition and universal energy access, it should continue to be at the center of what the electricity sector in developing countries needs to support the scaling up of energy access and renewables, which is financially viable utilities and competitive markets.** This includes subsidy issues, but also governance and broader power sector reform. As outlined in ESMAP's report on power sector reform,[12] the technological changes that are underway are disrupting and changing the whole power sector, e.g., variable power generation, and increasingly decentralized generation are posing fundamental questions about viability of utilities and the structure of the power sector. In addition, past expensively procured power from IPPs are also dragging down the sector. According to the latest RISE report, the deteriorating fiscal position of national utilities is putting at risk the progress made on sustainable policies. This reality emphasizes the strategic relevance of ESMAP's ESRF, which has expanded in response to the poor financial viability of utilities, especially in Africa (see also Section 4.4.3).

Interviewees emphasized two points with regard to what is commonly referred to as the "energy transition." First, universal access to sustainable energy will require planning, grid strengthening investments, pricing reforms (possibly including gas and coal pricing too)—and although renewable energy and off-grid electricity are forming an increasingly important key component of achieving that goal, they are difficult starting points for tackling underlying problems with WBG clients. Many EEX GP managers, coordinators, and task teams regretted the lack of ESMAP support for natural gas, feeling that it limited their ability to support countries in a pragmatic energy transition and one that accelerates access to electricity.

Second, many interviewees felt that ESMAP support for the energy transition at a more fundamental level has been somewhat missing. Although the VRE Grid Integration Support window has provided

[12] Foster, V., & Rana, A. (2020). *Rethinking Power Sector Reform in the Developing World.* Washington, DC: The World Bank Group. doi:10.1596/978-1-4648-1442-6.

essential support to the transition, interviewees felt it is not sufficient, because energy transition is also about establishing competitive markets and integration with other sectors, and the appropriate allocation of grid costs. Currently, ABG funds, sometimes in combination with Public-Private Infrastructure Advisory Facility (PPIAF) funds, are used to support power sector and market reform. But ABG money is very limited to address these fundamentals and is often needed for just-in-time responses. Similarly, energy subsidy reform (ESR) is also an entry point and can contribute to creating a level playing field for renewable energy and incentivizing energy efficiency, but it is typically only tapped into when there is a crisis. It is not currently seen as an instrument for planning and supporting the sustainable energy transition.

3.3. Relevance to regional and country needs

The relevance of ESMAP's thematic and cross-cutting windows differs across regions. This reflects in part the level and focus of Bank lending on one hand, and regional needs and resources, the configuration of the energy transition, and the structure and state of the power sector on the other hand. The nature and pace of change and disruption in the power sector as a result of reform, grid extension, new technologies and decentralized generation is different in Sub-Saharan Africa, Middle East and North Africa (MENA), Latin America and the Caribbean (LAC), Europa and Central Asia (ECA) and Asia. Support for the energy transition has come from different funding windows in ESMAP, but has been strongest in energy access, renewable energy, and grid integration of renewables, while energy efficiency has so far been concentrated in LAC, ECA, and East Asia and the Pacific (EAP).

The country case studies showed that, overall, ESMAP-funded activities are relevant and respond to clients' immediate and strategic needs. On the whole, across the 12 country cases, ESMAP activities were linked to specific requests from clients, as well as the WBG's strategy for country engagement (e.g., Systematic Country Diagnostics [SCDs] and Country Partnership Frameworks and Strategies [CPFs]). In interviews, government country clients were aware and appreciative of ESMAP support. ESMAP's agility to provide just-in-time support for emergent needs, such as development policy financing (DPF), was also appreciated. At the same time, ESMAP's knowledge work and staff expertise (e.g., on new frontier technologies, such as offshore wind, energy storage, and clean cooling) was seen as effective in helping to shape client demand, by positioning ESMAP, and by extension the WBG, as a trusted thought leader in these areas.

In a few countries, **the evaluation also identified instances where ESMAP support effectively adapted to changes in country priorities and needs.** In Zambia, a VRE grant was cancelled due to a change in the utility's financial situation, and the team pivoted to request ESMAP support instead for sector fundamentals and off-grid components. In Ethiopia, a programmatic ESMAP grant was seen as useful to support evolving country needs over a multi-year period and push toward an integrated on- and off-grid electrification program and associated World Bank lending operations.

Within countries, coordination is dependent on government preferences and capacity for coordination, as well as the presence and effectiveness of sector coordination groups for development partners, and

the WBG's role in these groups. The country case studies showed that coordination at the sector level is generally perceived as effective, but that synergies between sector programs could be improved at the technical level. In addition, interviews with governments and development partners in-country illustrated that relevance is also subject to inter-agency dynamics (e.g., among ministries, regulators, utilities, and other sector actors); some evidence was available that these dynamics can detract from the effectiveness of ESMAP-funded activities, although this could not be fully triangulated (see also Section 4.5 on drivers of and barriers to effectiveness).

Appendix D provides more details on the relevance of ESMAP's thematic and cross-cutting windows by region.

4. Effectiveness and Sustainability

This section examines the effectiveness and sustainability of ESMAP-supported activities. In Section 4.1, it answers key questions related to the extent to which ESMAP-funded activities and programs achieve the Results Framework and project-specific intended outcomes, drawing on the portfolio and activity-level analyses, as well as the country case studies. Section 4.2 addresses the extent to which ESMAP activities incorporate gender issues and the contributions of the fully integrated gender program to closing gender gaps. Then Section 4.3 examines ESMAP's approach to knowledge. Section 4.4 provides a deeper look at three ESMAP programs. Finally, this chapter concludes in Section 4.5 with a synthesis of key drivers and barriers influencing the achievement and non-achievement of ESMAP outcomes and affecting sustainability.

4.1. Progress toward outcomes

4.1.1. Results Framework achievement at the Business Plan and program level

This section assesses the extent to which ESMAP-funded projects and programs achieve the Results Framework intended outcomes, particularly around development finance informed and policy/strategy informed. It draws primarily on portfolio analysis, the activity-level analysis, and document review. An assessment of the relevance, coherence, and consistency of the Results Framework is provided later in the report, in Section 6.4.

Three-quarters through the business plan, ESMAP programs have reported good progress toward the Results Framework outcomes. Programs have reported particularly strong progress on outcome targets related to development finance informed. Through FY2019, over three-quarters of the Results Framework targets related to development finance informed have been achieved or exceeded. The remaining targets have been more than half achieved (e.g., 7 of the targeted 10 WBG operations informed). Results Framework targets related to policy/strategy informed, client capacity, and knowledge increased are also generally on track to achieve targets as of FY2019.

Overall, Results Framework indicators are reasonably linked to statements of outcomes at the individual activity level, and program-level progress reports have helped support accountability for

reporting against the Results Framework. This finding is informed by the activity-level analysis and country case studies. Still, there is room for improvement in terms of clearer articulation of how ESMAP outputs and advice were used to support a specific change. In a few instances, the evaluation team struggled to obtain unambiguous written and interview evidence that ESMAP contributed to an outcome at the level identified in the results framework (e.g., defining and implementing an energy sector-wide approach and tool in Zambia).

The ABG grants are less transparent in terms of linking activity-level outcomes to Results Framework outcomes and describing how ESMAP activities informed development finance. The ABG Progress Reports for FY2017 and 2018 list 18 and 17 operations informed, respectively, but many of these are not described in the narrative of the report to better justify their inclusion. This has been improved in the recently available FY2019 ABG Progress Reports. ABG progress reporting is also not clear about whether lending operations that have been informed by the regional Gender and Energy Programs are included in its targets and reporting (see also Section 4.2 on gender).

Several factors suggest that the Results Framework targets could have been more ambitious for certain programs for development finance informed. First, most targets were achieved or exceeded halfway through the business period. Second, more than half of the activities in the sample described linkages to a WBG operation in their grant reporting and monitoring (GRM), suggesting substantial opportunities to inform development finance. Finally, comparing the total number of activities approved in the first three years of the business period targeting development finance informed outcomes with the Results Framework targets can give some implication of expected success rates, as shown in Table 4-1. However, these must be interpreted carefully since activities approved earlier that were under implementation and closed during the FY17-19 business period can deliver additional outcomes, as can own-managed activities and cross-support that links with operational lending. This comparison suggests potential for higher development finance informed targets for Global Facility for Mini Grids (GFMG) and energy efficiency.

Table 4-1. Development finance informed: Results Framework targets and approved activities with this outcome expected

ESMAP program	Key Results Framework target for development finance informed	Number of activities approved in FY17-19 with DFI outcome expected
ABG	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	36
ESR	At least 5 Bank lending operations informed over the business plan period	5
ECCH	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	4

ESMAP program	Key Results Framework target for development finance informed	Number of activities approved in FY17-19 with DFI outcome expected
GFMG	3 new World Bank operations informed	6
Urban Poor / Host Communities	2 World Bank energy access projects supported	3
Lighting Global	At least 8 World Bank projects with solar off-grid components supporting growth of sustainable markets, mobilizing private sector funding	6
Geothermal	3 New World Bank Operations Informed	1
RE Mapping	At least 5 WBG operations informed	6
VRE	At least 8 new WBG operations informed	8
Solar scale-up	At least 10 WBG operations or external projects informed	8
EE Buildings	At least 10 buildings related WBG operations include sustainable energy components	17
EE City Services	At least 8 World Bank Group operations informed	21

Source: ESMAP activity dashboard for number of activities, November 2019

Analysis of the distribution of Results Framework outcomes among countries suggests that multiple and/or successive grants in a country contributes to results achievement. This finding is also supported by the country case studies, and further discussed in Section 4.5 below. Results Framework outcomes were reported for 77 of the 97 countries and sub-regions[13] that received ESMAP grants during the evaluation period. The 20 countries for which no outcomes have yet been reported at the Results Framework level account for 11 percent of overall ESMAP resources allocated to countries and sub-regions; among these 20 countries, about half have grants that have closed during this business period. On average, the countries for which outcomes have been counted at the Results Framework level received more than 2.5 times as many grants and as much grant resources per country as those without outcomes, as shown in Table 4-2.

[13] For the purpose of this analysis, grants to "World" or regions such as "Africa" are not included.

Table 4-2. Average grants and grant amounts for countries with and without Results Framework outcomes

	Country with Results Framework outcomes	Country without Results Framework outcomes
Average number of grants per country	3.5	1.4
Average total grant amount per country	$1,193,137	$587,966

Source: ICF analysis of Results Framework reporting from ESMAP progress reports and Annual Reports and ESMAP activity dashboard

Ten countries account for over one-third of the country-related Results Framework outcomes achieved. These ten countries represent about a fifth of total overall ESMAP resources allocated to countries and sub-regions. Two operations in Haiti (Renewable Energy for All, and Modern Energy Services for All), as well as the Kenya Off-Grid Solar Access Project (KOSAP) are counted among the lending operations informed in separate targets for the GFMG, Lighting Global, Solar Scale-up, and VRE programs. This illustrates the synergies among the ESMAP programs to bring multiple influences on a single operation. This finding also shows the limitations of aggregating the Results Framework results across ESMAP programs (with the same lending operations counted by multiple programs); ESMAP's impact accounting approach helps to address this issue.

Table 4-3. Top ten countries in terms of number of outcomes counted in the Results Framework, compared to the proportion of resources allocated to each of those countries

Country	Number of outcomes counted in the Results Framework	Proportion of resources allocated*
Haiti	16	0.1%
Kenya	13	1.1%
India	12	2.3%
Vietnam	8	2.7%
Nigeria	8	2.0%
Zambia	8	2.3%
Uzbekistan	8	1.0%
Madagascar	7	1.2%
Myanmar	7	2.6%
Ethiopia	6	3.2%

* As a percentage of total resources allocated to country and sub-regional activity grants.

4.1.2. Outcome achievement at the activity and country level

This section addresses the extent to which ESMAP-funded activities achieve the intended activity-specific outcomes, and why. It draws primarily on evidence from the activity-level analysis as well as the country case studies.

Activity-level results achievement

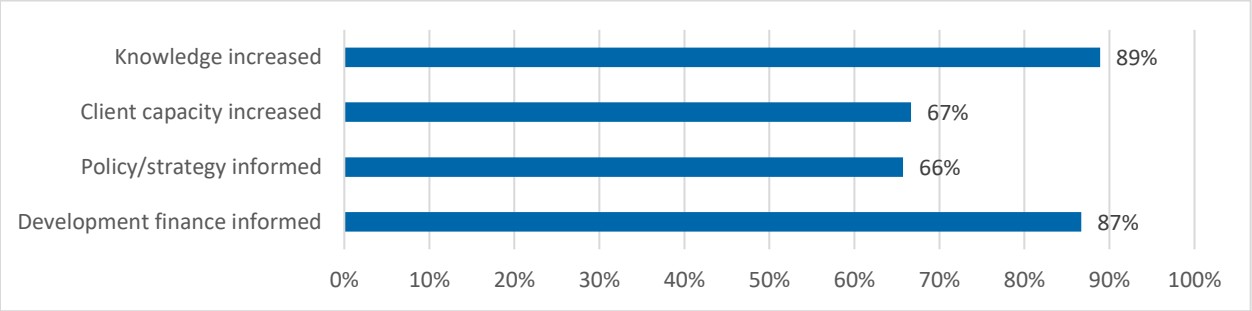
ESMAP-funded activities have performed reasonably well in delivering intended activity-specific outcomes. Based on the evaluation's activity-level analysis, three-quarters of intended outcomes were achieved in closed activities,[14] and a further 10 percent were deemed partially achieved by the evaluation.[15] About three-quarters of closed activities were rated "likely" for overall outcomes and sustainability. Nearly 90 percent of closed activities were rated as satisfactory or highly satisfactory in achieving grant objectives. The rate of outcome achievement was higher for development finance informed and knowledge increased and lower for policy/strategy informed and client capacity increased, as shown in Figure 4-1.

However, the quality of GRM reporting is variable. **More than a third of activities with GRM completion reports did not report outcome indicators**; most of these activities were approved in the previous business period. Some of these activities described in qualitative terms the results achieved, but did not report indicators with baselines, targets, and progress achieved. Among the outcome indicators, **reporting against client capacity strengthened was weakest**, with many activities reporting outputs in lieu of outcomes (e.g., delivered a report, conducted a workshop or south-south exchange, provided advice on certain topics, trained staff). Reporting against policy/strategy informed was also subject to similar limitations in some cases. Because of the short timeframe for implementing ESMAP grants (e.g., sometimes one year or less), it may be too early to observe such outcomes at the time of grant closure and reporting, with the application of knowledge acquired by clients possibly to come, as discussed below.

[14] Among those that reported against outcome indicators.

[15] For the purposes of this evaluation, outcomes were considered "achieved" if the description of the progress achieved matched the target. Outcomes were considered "partially achieved" if the description of the progress achieved was substantial but only partially matched the target. For example, if two changes were planned as part of one outcome indicator, but only one of the two was reported as achieved, then the outcome was considered partially achieved. As another example, if the outcome target was related to the implementation of a policy, and the progress was adoption of that policy but not yet implementation, the outcome was considered partially achieved.

Figure 4-1. Rate of outcome achievement in closed activities, by outcome type



Source: ICF analysis of activity sample. Outcomes were considered "achieved" if the description of the progress achieved matched the outcome target. The analysis, however, is subject to the limitations described above in terms of activities that did not report outcomes and the conflation of outputs and outcomes.

The most common reason that outcomes that were not achieved or were partially achieved is that the output had been delivered at the time of grant closure, but the outcome had not yet been observed. For example, in multiple closed grants, a study or report had been delivered, but the recommendations had not yet been taken up by the government counterpart. In two ABG grants, the activity had expected the client to create a national fund (one for off-grid and one for energy efficiency), but at completion, while the client was aware of potential opportunities, such funds had not yet been established. No robust trends were observed in terms of the rate of non-achievement or differences in the reasons for non-achievement among the thematic programs.

For many of the activities for which the intended outcomes were considered partially achieved, the progress to-date suggests strong potential for future outcome achievement. For example, for one grant, while the intended outcome was "implementation of comprehensive sector reform," at completion, the sector reform concept and detailed action plan for its implementation had been adopted by Cabinet Ministers, although implementation had not yet begun. In a Small Island Developing States (SIDS)-DOCK grant, the intended outcome was that the World Bank project was "ready for presentation to Bank's Board," while its status at completion was that the project is currently under appraisal. As a third example, a renewable energy grant aimed to have the "auction design for large-scale grid-connected RE projects enhanced and success rate increased;" at completion, IFC had signed a mandate to advise on auction-based procurement for a pilot solar PV project of 150-200 MW, showing good potential for achievement of the intended outcome target. These grants might well be considered to have achieved relevant outcomes, just not the specific outcome targets as written. A key learning for ESMAP could be to work with task teams to identify outcomes that are realistic to achieve during short grant periods; as long as the contribution of these shorter-term outcomes to the ultimate outcomes and impacts is clearly articulated, such an approach should not influence the overall ambition of ESMAP activities.

About half of the activities that did not achieve or partially achieved outcomes were rated as substantial risk at completion. Risks related to government ownership or commitment (e.g., of activity recommendations or political and social will to implement reforms), volatile political situations, low

client capacity, and lack of policy or regulatory frameworks to support the activity outcomes. Nearly all activities in this cluster identified follow up activities related to World Bank ongoing engagement, for example, linkages with continued Bank discussions on related topics or a follow-up activity to support further progress. **Among those activities still in progress, just 15 percent of the sample identified risks as substantial.** For several of these activities, substantial risks relate to serious changes in the political situation (e.g., Yemen, Nicaragua). Some other activities involve complex reforms and multiple agencies and thus risk of outcome achievement is perceived as high. Across all sampled activities, the proportion of activities rated as having substantial risks was higher in the ESRF and ABG themes.

Country-level results achievement

Through the country studies, the evaluation took a deeper look at results achieved and how activities and themes work together at the country-level to produce results. In this section, some key outcomes from the remote country studies are first described, followed by longer descriptions of the findings from the in-person country studies to Vietnam, Kenya, and Niger. The country study findings also inform the remainder of this chapter, including on gender (Section 4.2), knowledge (Section 4.3), and the deeper program assessments (Section 4.4), as well as the following chapter on impact. This chapter concludes with key learnings for ESMAP looking across all 12 of the country studies, in terms of the factors that affect results achievement or non-achievement (Section 4.5).

The country studies[16] offered some examples of activities implemented during the business period that have already led to notable policy and reform outcomes, as well as development finance informed.

- In **Mongolia**, a series of three renewable energy activities (under the VRE and solar scale-up windows) built on each other to inform a 10 MW solar PV component in the Second Energy Sector Project (ESP2) approved in May 2017, as well as to support an amendment to Mongolia's renewable energy law that passed in June 2019 and introduced upper limits for tariffs of grid-connected solar and wind systems and competitive selection (auctions) for renewable energy power plants. Most of Mongolia's domestic generation is from coal-fired thermal power plants (85 percent), with the remainder coming largely from wind and hydropower. The Gobi Desert offers substantial resources for wind and solar development.

  Two additional linked activities in Mongolia (funded jointly by efficient and sustainable buildings, efficient cities, efficient, clean cooking and heating [ECCH], and ABG) focused on developing a roadmap for efficient heating in Ulaanbaatar and supporting the government to develop an electricity for heating program for the ger area of Ulaanbaatar with the aim to replace polluting heating appliances with clean and affordable solutions. These activities together informed the design of two follow-up investment lending operations, namely the Additional Financing (AF) to

[16] Many of the outcomes in Egypt, Ukraine, and Nigeria were primarily related to those priority programs covered in the deep dives, and are addressed in Section 4.4 further below, although the key lessons learned from these country studies are incorporated in the final part of this section on factors that affect results achievement or non-achievement.

Ulaanbaatar Clean Air Project focusing on clean heating in ger areas (approved in September 2019), and the Ulaanbaatar Heating Sector Improvement Project (HSIP) focusing on district heating network rehabilitation and upgrading in urban and ger areas (under preparation and expected to come to Board in FY2020). ESMAP provided support to the design of the AF, including technical assessment of baseline and targets and proposed clean heating technology and business models, as well as technical assistance and capacity building of staff at Ministry of Energy and Municipality of Ulaanbaatar**.** In particular, ESMAP-funded analysis identified options for introducing electric thermal storage technology into the ger areas, which is now being piloted under the AF. The HSIP lending operation includes recommended priority investment items from the efficient heating roadmap developed under one of the ESMAP activities. These two ESMAP activities have also informed the Bank's heating sector strategy in Mongolia, as reflected in the SCD.

Together, these ESMAP grants have also provided important inputs into the Energy Sector Master Plan, which is currently under preparation with ESMAP support. This Plan will be a long-term, nationwide plan focused primarily on the electricity and heating supply sectors, recognizing that Mongolia's key concern of new supply in its fast-expanding economy (driven largely by mining). Relying on ESMAP's analytical work, dialogue is also underway with the Government to increase the proportion of new supply generated from renewable sources, rather than coal.

- In **Bangladesh**, ESMAP has provided wide ranging analytical, data and technical advisory support to government agencies and utilities for the further expansion of rural electrification, for introducing renewable energy in the energy mix, for scaling clean and more efficient cook stoves, and in industrial energy efficiency. An ECCH-funded grant is supporting the implementation of the ongoing Bangladesh Clean Cooking Program, by bringing in international sector experts to provide monitoring and verification techniques and developing a robust GHG emissions reduction methodology, including using satellite imagery, in line with GCF requirements. The grant is also financing expert consultants to move the market to tier 4 ICS, and to help develop a sustainable commercial market for higher efficiency cook stoves. Further, it will help develop a strategy for the sustainable supply of biomass, which will be validated using data from a second ESMAP grant conducting a survey on harvesting, consumption and use of fuelwood. Together these grants have supported the detailed design in the implementation phase of two World Bank lending operations: the Sustainable Forests and Livelihoods project (approved in October 2018), and Rural Electrification and Renewable Energy Development project (RERED II), for which a second additional credit was approved in 2018, including to scale up improved cook stoves in rural areas from 1 to 5 million.
- In **Rwanda**, the results of ESMAP's MTF survey and support flowed into several policy documents. The MTF results informed: Rural Electrification Strategy (RES, 2016); Updated Energy Sector Strategic Plan (seven-year document); National Electrification Plan; and Ongrid Transmission Plan, among others. All of these plans now consider the level of service. In particular, the RES reframes the access target based on the Tier level of access defined by the MTF, and the implementation of the RES is monitored based on baseline survey data from the MTF. Rwanda's national household survey now includes a shorter version of the MTF module, which will be repeated every two to three years by the national statistics office. With further funding support from the European Union, the current survey also includes a cookstove component, building on the MTF. The results of the MTF also informed the World Bank's Rwanda Renewable Energy Fund Project (approved in May 2017)

and the energy access targets in the recent energy sector DPF series. The DPF series was also informed by support from the ESRF, discussed further in Section 4.4.3.

- In **Ethiopia**, ESMAP has been front-running a significant portion of the World Bank's energy investment portfolio through a four-year programmatic series of activities (funded largely by ABG, as well as renewable energy and SE4ALL TA), as well as other supporting grants and activities (ESR, MTF, Lighting Africa). These activities allowed the World Bank team to provide long-standing, deep support to the Government to re-think and re-design their approach to electrification and led to both policy and development finance outcomes for the country. Early support from a geospatial planning grant and later from the MTF helped to pave the way for a new understanding of access.

  ESMAP's continued analytical, capacity, and policy dialogue support ultimately led to a National Electrification Strategy, a National Electrification Program (NEP) – Implementation Roadmap, and most recently the NEP 2.0. The latter program details the financing requirements and mechanisms to achieve universal access to energy by 2025 and importantly expands to off-grid approaches to meet the target of 35 percent off-grid electrification. These constitute the foundational programmatic documents that the Government of Ethiopia will use to promote the coordination and alignment of relevant government agencies and development partners toward the achievement of the goals.

  The World Bank has subsequently financed this national program, with one lending operation mostly focused on on-grid connections with a smaller off-grid component (Ethiopia Electrification Program, approved in February 2018) and an upcoming off-grid electrification program in a new operation (Accelerating Distributed Electricity and Lighting in Ethiopia, under preparation and expected to go to Board in FY2021). The WBG's Ethiopia CPF for FY2018-22 also credits ESMAP knowledge and analytical work as part of its intervention logic for CPF objectives related to reliable energy and sustainable infrastructure.

- In **Zambia**, ESMAP support for geospatial electrification planning and from Lighting Africa have informed the Zambia Electricity Service Access Project (approved June 2017). The MTF survey has concluded, and the Ministry of Energy is currently reviewing its access definition. Two other ESMAP activities focused on renewable energy mapping and grid integration, but progress has slowed. This is due largely to the change in the utility's financial position stemming from costly generation capacity procured at the height of the recent power crisis and lack of cost containment. The utility's financial distress meant that the ESMAP activity to support VRE was no longer well-timed; that activity was closed, and the funds were returned to ESMAP. Instead the country team is submitting a programmatic grant to support numerous aspects of sector development, including off-grid electricity access, clean cooking, and policy dialogue on sector viability.

- In **Dominica** an ESMAP grant contributed to completing the preparation of the Dominica Geothermal Risk Mitigation Project, which will finance the construction of the first geothermal power plant in the Caribbean Region in 30 years and the first ever financed by the bank in LAC. In addition, ESMAP also channeled a US$10 million grant funding from the UK Department for International Development (DFID) and US$2 million from the SIDS DOCK initiative to the project.

BOX 4-1. ESMAP IN VIETNAM: A CASE STUDY

Vietnam is one of the most energy-intensive countries in East Asia, and electricity demand is expected to continue to grow at 8 percent per year through 2030. At the same time, Vietnam has pledged in its Nationally Determined Contribution (NDC) to reduce its greenhouse gas emissions by 25 percent by 2030 with support from the international community. The country is also preparing a new Power Sector Development Plan 8 (PDP8) which aims to integrate in the grid significantly more renewable energy sources and scaling up demand side energy efficiency.

Energy planning in Vietnam has been strong both in terms of the quality of the planning and its link to implementation, the clearest proof of which is the rapid development of a modern and reliable power system in the country. However, the power sector in Vietnam is at a critical decision point with a raft of important changes under consideration coupled with a potentially high growth rate in demand and supply being sustained over the next decade. A shift towards markets and significant private generation including renewables is anticipated.

Vietnam has graduated from IDA and is now a lower-middle income country. It has a dynamic and rapidly growing economy, with huge demands for power and associated capital investment. Debt ceiling constraints have created a powerful focus within GoV on power market reform, building policy frameworks that support scaling, private investment, and least cost planning.

ESMAP funding and expertise has played a central role in supporting the energy transition in Vietnam as part of a wider ongoing engagement between the World Bank and Government of Vietnam (GoV). Among all donors and IFIs, the World Bank plays the role of trusted partner for energy policy development – a relationship which has built up over the years. Thirteen ESMAP-funded activities have been implemented in Vietnam over the period under review, which in turn reflects the deep level of cooperation and alignment between the Bank's country strategy, ESMAP, and the policy agenda of GoV. ESMAP's engagements in Vietnam have been demand-driven, given the GoV's often good vision on where it would like to take the energy sector, but lack of detailed technical capacity to assess options or identify the most appropriate strategies for implementation.

The use of ESMAP TA support at the heart of GoV energy planning has been central to a number of important market and policy developments in Vietnam. The figure on the following page illustrates how the ESMAP suite of activities has worked to play a central role in the development and formulation of Vietnam's energy policy. Key outcomes include the following:

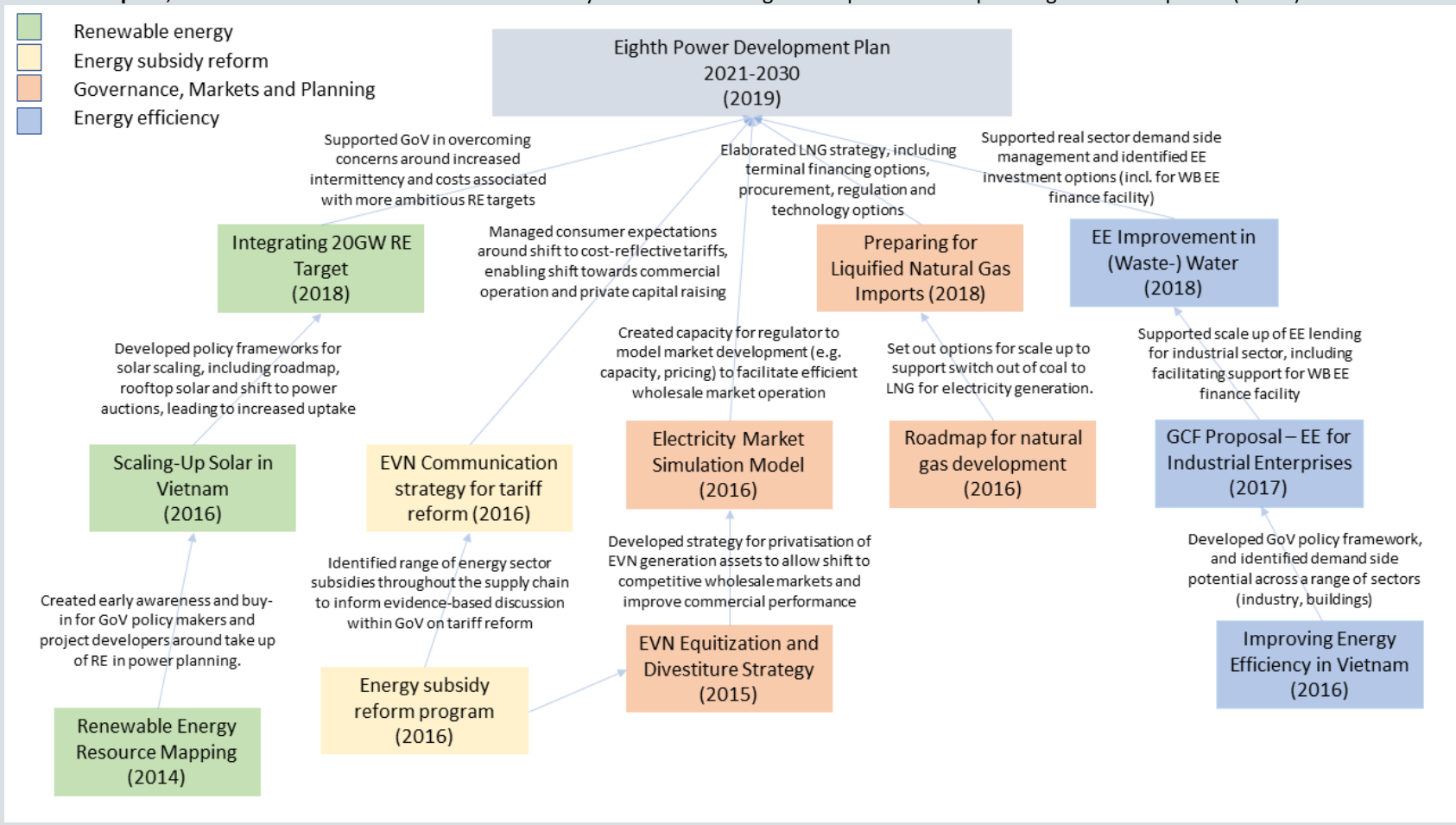
- The development of a new Energy Efficiency strategy (including mandatory standards) and a significant scaling of financial resources for industrial energy efficiency, including from the GCF.
- A shift from FITs towards solar auctions (and potential replication for other types of RE), allowing Vietnam to evolve from higher cost incentives to more cost-effective planning.
- Progress on subsidy reduction and strengthening of the financial stability of the power sector through reduction of cross subsidy and a move towards cost-reflective tariffs.
- Development of private sector approaches that reflect the more limited role of GoV in procuring and financing centralized generation capacity (e.g., new rooftop solar model).
- Divesture of generating assets, wholesale market development, with an increased commitment to move incrementally towards competitive power markets.
- Increased GoV comfort and ambition in relation to renewable energy targets as part of power sector planning and targets and to meet growing power demand.

The GoV is no longer borrowing due to reaching debt sustainability limits. As an emerging middle-income country, Vietnam is also graduating away from government-led investment towards capital markets and private investment (e.g., in renewables, energy efficiency, LNG). However, during the period, the World Bank mobilized US$75 million of GCF resources to provide partial risk guarantees for energy efficiency lending by other financial institutions (P164938, P164909). This guarantee will run alongside a World Bank energy efficiency lending operation (Vietnam Energy Efficiency for Industrial Enterprises) launched in 2017.

ESMAP IN VIETNAM: A CASE STUDY, CONTINUED

The figure below illustrates how the coherence of numerous ESMAP activities in Vietnam has contributed to significant results. These findings are triangulated across interviews with senior GoV representatives in the energy sector (e.g., Ministry of Industry and Trade, Regulator, Utility), interviews with World Bank staff, and activity documentation. Key aspects to note in the Vietnam case are the:

- **Phasing** of ESMAP interventions, including how one intervention led to another within a given thematic area over the period.
- **Scope**, in that ESMAP works on all significant policy areas in parallel as GoV's preferred partner on energy sector development.
- **Alignment and linkages** of activities across thematic areas, for example, the linkages between subsidy reform and the ability to shift towards wholesale markets under the ABG workstream.
- **Purpose**, in that the suite of activities work coherently towards informing overall power sector planning and development (PDP 8).



ESMAP IN VIETNAM: A CASE STUDY, CONTINUED

In addition to the support described above, the ESMAP-funded EAP gender and energy program has provided support for women leaders in the Vietnam Energy Company, EVN. EVN had a goal to increase the share of women in leadership. ESMAP's support was delivered alongside other ESMAP supported capacity work to assist the financial stabilization and a communications strategy through tariff reform. ESMAP supported gender strategy development and structured training on gender equality and sensitization. This program was transferred to EVN for ownership, and the Women in Leadership program is rolling out training and mentoring and improving data systems. The impact has been an increase in women at the Director level from 0 to 10 percent and women in management from 16.2 to 17.1 percent in Head Office.

BOX 4-2. ESMAP IN KENYA: A CASE STUDY

Kenya's current effective installed (grid connected) electricity capacity is 2,651 MW, with peak demand of 1,912 MW, as of November 2019, of which 726.6 MW is geothermal. The country has seen recent strong progress in grid and off-grid electricity access, with an access rate of approximately 75 percent, achieved through both the grid and off-grid approaches. The relevance of ESMAP-funded activities to energy access at the country level in Kenya is both comprehensive and deep, reflecting its long-standing dialogue and engagement with the Government prior to the K-OSAP project, including through making available experts to the government. This has also resulted in ESMAP's recognition and visibility both to the government and utilities, development partners and the private sector.

Energy access. ESMAP has made a substantial contribution to increasing both on-grid and off-grid energy access in Kenya through funding for Geospatial Planning, and electricity demand and consumption surveys, including under the MTF, which led to the Kenya National Electrification Strategy (KNES). Interviews indicated that the data and resulting strategy gave confidence to donors to invest in the Last Mile Connectivity Programme of the GoK and led to a stand-alone off-grid solar and clean cook stove Bank project, K-OSAP. ESMAP provided extensive inputs to the design of the KOSAP project, in particular on the stand-alone solar systems and the clean cook stove component, and to a lesser extent on the mini grid component. Yet concerns were raised by several development partner and private sector interviews about the PPP mini grid model in K-OSAP, which limits the role of the private sector to a 7-9 year PPA and as O&M operator, and which mandates a uniform tariff. Nonetheless, there is significant private sector interest from mini grid companies that have taken on an EPC role. Broader concerns were also raised about the relatively minor role of mini grids in the KNES, compared to the potential contribution that mini grids could make. These issues are elaborated in more detail in Section 4.4.1 on ESMAP's Global Facility on Mini Grids.

Geothermal. ESMAP supported the development of a National Geothermal Strategy that would provide an improved framework for public and private involvement in the sector, and ultimately lead to increased investment in the sector. The geothermal strategy has still not been launched, and its value was questioned by government and development partner interviews. In the geothermal sector in Kenya, a lack of institutional clarity, a steam sale model led by GDC that is incompatible with reduced sovereign guarantees and that requires deep technical capacity, and an inadequate regulatory framework is hampering further development. The strategy identified some of the main problems affecting the sector and identified the pros and cons of six different models for geothermal development, but did not address the issue of reservoir management, which was seen as important by interview partners. The strategy also calls for establishing a Strategic Geothermal Planning Unit at the MoEP to coordinate the activities of KenGen and GDC. The MoEP is expected to launch the strategy after it is updated to reflect the 2019 Energy Act.

ESMAP IN KENYA: A CASE STUDY, CONTINUED

Annual Block Grants. ESMAP's ABGs have been used to engage with and support the regulator in the task of reviewing and re-aligning the sector's regulatory framework with the 2019 Energy Act, and on options for transitioning to a wholesale market. The new regulations that are being drafted by the regulator, and which will amongst other things impact private mini-grid development, rural electrification in general, and will usher in net metering, has not been released yet. Distributed generation enabled by net metering will for the first time permit consumers and other actors in Kenya to participate in the production of electricity. Yet the speed of the technological transition will depend on the design and implementation of the new regulatory framework. A review of power sector regulation in Kenya found a significant difference between regulation on paper and in practice.* Nonetheless, ABGs have been used to strengthen the capacity of the regulator to analyze and operationalize the new Energy Act, as confirmed through interviews with the regulator.

The ABGs were also used to develop the business plan of REREC, the Rural Electrification and Renewable Energy Corporation. Interviews indicated a weak outcome and mixed views. The business plan was considered outdated by REREC as a result of the new Energy Act, which gives them a broader mandate, but was seen as still having some potential to influence by WBG interviewees.

Gender. Kenya was deeply engaged on energy and gender and enhancing gender equality through missions, field work and client dialogue. Gender gap profiles were developed for Kenya, and gender training was provided for the project implementation unit (PIU) of K-OSAP. ESMAP also provided additional funding for the women segment in market segmentation studies that informed K-OSAP, with the view to making consumer finance more gender sensitive. Building on previous ESMAP work and on USAID's work on engendering utilities in recruitment and in policies, ESMAP's gender program support led to the inclusion of a budget of US$300,000 (IDA lending) for a women scholarship program of Kenya Power and Lighting Company (KPLC), which will sponsor 50 women who cannot afford training to attend the KPLC training school.

* *Source:* Foster, V., & Rana, A. (2020). *Rethinking Power Sector Reform in the Developing World.* Washington, DC: The World Bank Group. doi:10.1596/978-1-4648-1442-6.

BOX 4-3. ESMAP IN NIGER: A CASE STUDY

Niger's state utility NIGELEC has 165,300 consumers in the region of Niamey, Tillabery, and Dosso, with a peak demand of 115 MW. This corresponds to an average demand of 0.7 kW per customer. The current maximum available generation of NIGELEC is 126 MW. Rural electrification stands at around 1 percent. ESMAP's support in Niger has been highly relevant to these challenges, focused on off-grid and on-grid solar PV electricity access.

ESMAP financed the necessary technical and market studies, the design and setup of the financial instruments, as well as the development of the regulatory framework, to set the stage for and support the initial stages of implementation of the Niger Solar Access Project (NESAP). In addition, ESMAP, through the ABGs, has provided technical advice based on best practices for Niger's National Electrification Strategy. Prior to ESMAP, there was no data and little knowledge or understanding of solar energy in Niger. Government, WBG, and other interviewees felt it would not have been possible to design a solar PV Bank lending operation without ESMAP's technical assistance. The pre-feasibility study for grid-connected solar, inclusive of financing options, was well received and the MoE is in discussion with WBG-IFC's Scaling Solar Program.

However, despite being informed by an ESMAP-funded market assessment and TA to help design the financing mechanism of the solar kit and SHS component of NESAP, all government and development partner interviewees expressed concern over the adequacy of the financing mechanism. There is doubt that the two market rate credit lines for enterprises and consumers respectively will incentivize distribution and sales beyond urban areas that are already served by the off-grid lighting and solar companies, except for the solar irrigation pumps. In fact, the ESMAP-supported off-grid solar market assessment recommended a grant facility in addition to the credit line to support market take-off, but the Government was unable to implement a grant facility because the Ministry of Finance did not allow the use of IDA credit funding as a grant for the private sector. One of the factors also influencing uptake of the line of credit is the lack of an ecosystem of companies within Niger that can access it. To this end, the Bank has mobilized additional trust funds from DGIS to build capacity to address the challenge of building solar PV ecosystems in the Sahel countries. The funds will also benefit the mini grid component of NESAP.

The quality and conclusions of the market assessment were also questioned by government interviewees. The view was expressed that there is a need to put a context to the principle of not distorting the market, and to address the affordability gap in order to catalyze a SHS and lighting market from a very low base and reach underserved peri-urban populations. According to interviewees, Lighting Global certified products, despite being import tax exempt as a result of ESMAP/Lighting Africa supported dialogue, are deemed unaffordable to all but a small minority of the population, and the market suffers from cheaper products and counterfeits. Lighting Global certified products came on the market as a result of NESAP and ESMAP. However, the project is still in the early stages of implementation, and the awareness raising activities had yet to begin at the time of the evaluation's country visit.

Development partners felt that the solar hybrid mini grid component of NESAP, which was also informed by ESMAP, may need further technical assistance support due to the undeveloped state of the sector and the lack of experience and standards. The rigor and methodology of the solar hybrid mini grid pre-feasibility study was questioned by government interview partners, and the need raised for a more participatory approach as an integral part of conducting the studies. The quality of the pre-feasibility was likely affected by the limited time available to finalize the study in preparation of the investment operation and carrying out the study in conditions of worsening security. Government capacity also plays a role. Despite the concerns raised, program implementation of the hybridization of existing mini-grids has progressed well.

The burden of increased grid connected and isolated mini grid electrification on an already overstretched and underperforming utility raises the question whether energy access support should be preceded by a diagnostic assessment of the sector to identify weaknesses and where support should be targeted. It also raises the question of how diagnostic and systematic ESMAP's support in a country's electricity sector should be. Yet access remains a key priority, and more recently, the Ministry of Energy has developed a least cost generation plan financed by IDA, to further develop its electrification strategy. The problematic security situation in large parts of the country has weighed on the cost, quality and speed of data collection and is likely to impact the construction of the mini grids. It also has implications for budgeting for TA.

Niger has also benefited from support from ESMAP's Africa gender and energy program, with utility-level support on onboarding gender expert and support for the MTF analysis. In NESAP, the focus will be on the payment and application procedure for the new electricity connections, information campaigns, consultation processes under the social safeguards, and the National Electrification Strategy.

4.2. Gender

In the FY17-20 Business Plan, ESMAP transitioned from a stand-alone gender program to a cross-cutting one that works across all of ESMAP and all of the World Bank regions. This was expected to be implemented through two channels. First, within the ESMAP thematic and cross-cutting areas there would be gender-specific outputs as part of their program delivery. Second, ESMAP planned to build on the Africa Renewable Energy Access program (AFREA) and Asia Sustainable and Alternative Energy program (ASTAE) gender and energy programs to work with the other regions to develop demand-driven, regional gender and energy programs with a similar operational focus, and continue to use its experience on the ground to capture and disseminate knowledge and lessons.

Gender and energy program have now been set up for each of the six World Bank regions. The Africa and EAP regional programs were established prior to the evaluation period (the latter by ASTAE in 2014[17]), and the MENA, ECA, LAC, and SAR teams were established in 2017 and 2018. These teams provide review, consultations, operational support, and capacity building to energy task teams, as well as knowledge work. For operations, the teams provide upstream support at early project design phases, as well as technical support to current and pipeline operations.

4.2.1. Gender at the program and activity level

Through the Business Plan period, the gender program has collaborated with the thematic and cross-cutting programs to integrated gender into program initiatives. For example, with the Knowledge Hub team, the gender team has collaborated on the MTF through reviewing reports (e.g., Niger, Zambia, Kenya, Honduras), developing the gender analysis, and managing data experts to standardize gender-relevant aspects of the reports.[18] The ESMAP gender team also provided inputs to the report *Mini Grids for Half a Billion People: Market Outlook and Handbook for Decision Makers* (June 2019) on the chapters on community engagement, productive uses of energy, access to finance, and policy. Collaboration has also been strong with the ECCH program, including for own-managed knowledge work.

Although ESMAP continues to screen for and mainstream[19] actions to address gender inequality into its grants, evidence is limited on the effectiveness of this approach for closing gender gaps. ESMAP's strategic approach through the regional gender and energy programs has shown more evidence of

[17] In the EAP region, an ASTAE funded Gender and Energy TA Facility was launched in July 2014 to target the integration of gender and social inclusion into regional energy operations

[18] For example, related to issues such as headship by sex mapped against rural versus urban, access rate by income quintile, willingness to pay by headship and ownership of off-grid technology.

[19] Mainstreaming generally refers to systematically integrating gender perspectives in legislation, public policies, programs, and projects. In the context of ESMAP, the evaluation uses to term "mainstreaming" to refer to screening individuals grants for opportunities to integrate gender perspectives through, for example, gender analysis, gender actions, or monitoring for gender-specific outcomes (e.g., female participation rates or numbers of female beneficiaries).

results, as discussed in Section 4.2.2 below. ESMAP's experience during this business period appears to mirror the overall experience of the World Bank and other MDBs in terms of the tensions between mainstreaming and more strategic approaches to gender. Past approaches focused more squarely on gender mainstreaming, but mainstreaming alone has not been sufficient to close persistent gender gaps.[20] While the WBG, along with other MDBs, have not abandoned mainstreaming, the WBG's 2015 gender strategy also seeks to identify key gender gaps, close them through strategic actions, and systematically track those efforts. ESMAP's regional gender programs have effectively taken up this mantle of strengthening the country-driven approach, with better country diagnostics, policy dialogue, and sex-disaggregated data, as discussed further below.

Although there is internal commitment by the ESMAP Secretariat to screen all ESMAP activity proposals for gender, no target has been set for the outcomes of this screening.[21] Twenty percent of ESMAP activities approved in FY17 or later have been tagged as "high" or "moderate" in terms of their gender relevance.[22] Gender has also not been monitored at the Results Framework level, as there was no commitment under the previous Business Plan for gender program outcomes to be monitored at this level; among the Results Framework outcomes for this business plan period, only one has a target that is gender specific.[23]

The evaluation's activity sample showed similarly low rates of mainstreaming, with about a third of activities including gender analysis and/or consultation, specific gender actions, or monitoring and evaluation (M&E) of gender impacts at the proposal stage. Of those activities including gender components at the proposal stage, only half identified gender-informed outcomes in monitoring and completion reports. The majority of these were in the EA theme. Less than 10 percent of activities in the sample included an indicator on gender.

4.2.2. Gender and energy regional programs

The Gender and Energy Regional Programs have delivered substantial results, especially given their level of resourcing. Across the EEX GP, the ESMAP-funded gender programs helped ensure that 68 percent of the US$4.8 billion of the lending portfolio included actions to close a gender gap (24 out of 35

[20] World Bank Group. (2015). *World Bank Group Gender Strategy (FY16-23): Gender Equality, Poverty Reduction and Inclusive Growth*.

[21] This differs from the regional/operational support provided by the Gender team, where there is a goal of 55 percent gender tagging of WBG operations—an entirely different approach and method, as discussed in the section below on the regional gender and energy programs.

[22] ESMAP Activity Dashboard, December 2019.

[23] ECCH's target "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"

EEX operations), through achieving the designation of the WBG's "Gender Tag."[24] This is up from 44 percent of the lending portfolio influenced by the gender programs in FY18. These substantial results have been achieved through an approach that combines global and regional knowledge work with data and a country operational focus. Different regions have different emphases, depending on the number and type of energy operations, as described below.

Most regional programs have received about US$250,000–$320,000, with more allocated for East Asia and the Pacific (US$528,000) and Africa (US$580,000) during the business plan period, given that they were established earlier. In total, **these gender budgets represent less than 2 percent of approved resources during the period**.

- In Africa, the ESMAP-funded program supported 6 out of 15 energy projects that went to the World Bank Board in FY2018 and 11 out of 18 in FY2019. Most of these operations are focused on electricity access, although the range of operations also covers transmission and interconnection, energy sector operations, governance, and reform, and renewable energy development. **Among those 17 projects supported, 11 allocated specific project budget to support gender actions, ranging from US$300,000 to US$4.5 million per project.**[25] These actions include hiring a full-time gender specialist, gender mainstreaming capacity building, initiatives for women in STEM and the energy labor force, childcare provision, as well as gender-based violence (GBV) clinics and other related prevention and response activities. Allocating budget for implementation of gender actions has been a major obstacle to closing gender gaps targeted by lending operations, and thus this should be viewed as a substantial achievement. Box 4-5 describes some successes in this regard in Ethiopia.
- The EAP gender program has prioritized support to operations under preparation, rather than implementation, given available resources. In FY2019, 10 energy operations received technical support from the program. Interviews with the gender team, as well as the FY2019 ESMAP progress report, indicate that limits on the scope and the funding for the EAP gender program have tamped down what the program can deliver. Client requests for technical advisory to national and sub-regional energy companies and associations for strengthening companywide approaches for increasing women's employment and leadership have not been able to be met, although the program has helped identify and secure other sources of funding (e.g., Australian funding for Vietnam Electricity [EVN]).
- In LAC, the ESMAP-funded program has supported all three of the energy projects that went to the Board in FY2018 and FY2019. **Two of those three operations have allocated project budget to**

[24] The WBG's Gender Tag is applied to the Bank's lending operations in IBRD and IDA countries, to identify projects that have clear actions related to the four pillars of the Gender Strategy: closing gaps in human endowments (i.e. education and health); closing gaps in employment and work; removing barriers to ownership of physical and financial assets; and improving agency and voice (especially related to reducing gender-based violence). Projects are evaluated by the WBG's Gender Group after WBG Board approval, using a specific methodology, to determine whether a Gender Tag can be applied

[25] Based on gender monitoring data provided by the ESMAP Gender team to the Evaluation Team.

support gender actions, including support for women's employment in geothermal-related activities and targeting efficient street lighting in areas with high women's victimization and perception of insecurity. The program has also supported women's participation in geothermal, through trainings, events, and the creation of the Caribbean chapter of Women in Geothermal (WING), a global network promoting the education, professional development, and advancement of women in geothermal.

- In ECA, the ESMAP-funded program consulted with energy task teams of nine pipeline operations and two approved operations in FY2018 and eight pipeline operations and three approved operations in FY2019. This support included gender assessments for many of these projects, as well as more detailed analytical work and identification of gender actions to be financed by the projects in some cases.
- The MENA program has provided gender-related support to numerous lending operations over its two years of existence, including on concentrated solar power in Morocco, energy access in Djibouti, energy sector performance improvement project in West Bank and Gaza, emergency electricity reconstruction in Iraq, and energy sector performance improvement in Tunisia. As part of the DPF series in Egypt, the program focused on citizen engagement platform to ensure women can actively participate.
- In SAR, the gender program's model is based on a partnership-building framework with strong links to World Bank operations. The program supported four of the six operations that went to the Board in FY2019. A key activity has been the launch of the Women in Power Sector Network in South Asia (WePOWER), which was formally launched at a 2019 regional conference in Nepal and has been joined by 18 organizations so far. According to interviews with the gender team, this approach recognizes that the sector diagnostics paint a bleak picture for the region, and thus awareness must be raised and mindsets changed before job training for and recruitment of women could be effective.

The regional programs have also been responsive to guidance from the CG, which called for more proactivity to support women in science, technology, engineering, and math (STEM), increase women's participation in the energy workforce, and ensure that subsidy reform analyzes gender impacts, as indicated by some of the activities described above. A special ESMAP initiative is also addressing the research and evidence gap on women's underrepresentation as employees and leaders in the power sector. This initiative has included baseline data collection, internal and external stakeholder outreach, development of a toolkit and compendium of lessons learned and good practices, and pilot interventions through lending operations (e.g., in Ethiopia, Serbia). Other regional programs are beginning to replicate and build on these activities.

BOX 4-4. CLOSING GENDER GAPS IN ETHIOPIA

In Ethiopia, the Africa Gender and Energy team, in cooperation with the country team, has spearheaded the **Closing Gender Gaps Across Ethiopia's Energy Sector** initiative that created a transformational way of looking at gender across the entire US$1.5 billion World Bank energy portfolio in the country. This first-of-its-kind effort won the World Bank President's Award for Excellence in 2018.

The Government embedded gender priorities in the National Electrification Program, including:

- addressing occupational sex-segregation across the sector utilities with over 14,000 employees
- provision of child-care facilities in utility offices across all 11 regions of Ethiopia (a key impediment to female participation in the work force).
- supporting career development of female candidates (support for STEM education) as well as ongoing management and leadership training.
- prevention of, and response to, gender-based violence (GBV) in the workplace and project sites.
- promotion of female entrepreneurship in the off-grid market, as well as removal of productivity constraints of female entrepreneurs (access to finance), etc.

In the World Bank's Program for Results operation, significant resources (US$4.5 million) have been leveraged to support gender equality and citizen engagement at the Ethiopian Electric Utility (EEU). One of the operation's results framework indicators is percentage of women's employment at EEU increasing from 20 to 30 percent.

Sources: Interviews, see also: https://www.worldbank.org/en/news/feature/2019/05/03/energizing-growth-closing-gaps-between-men-and-women-in-ethiopian-energy-sector

ESMAP's gender and energy regional programs have benefitted over the business period from changes in World Bank culture and incentives, including Gender Tag targets for lending operations (as mentioned above), which have led to more demand for ESMAP support than available resources. This shift is also reflected in the types of lending operations supported by the gender programs, moving from predominantly clean cooking and access to a much broader range of energy sector interventions. **A challenge now is managing the relatively limited budget allocation (two percent in the business period, as noted earlier) against the need for both project design and implementation support.** Interviews indicate that most regional teams have not been able to provide much support for implementation—to help ensure that gender gaps are actually closed on the ground—given the need for design-phase support to meet Gender Tag targets and the level of available resources from ESMAP.

Challenges also remain in terms of ensuring that Board-approved projects set aside resources for gender actions that are embedded in the project components. Interviews and country case studies show that data work has been important to illustrate the need for these actions at the project design phase—i.e., to show the gender gaps and how much it will cost to address them. Continuing to work at

the nexus of data, knowledge, and operations can help demonstrate to risk-adverse task teams and country counterparts that they can deliver on gender-related results.

4.3. Knowledge

ESMAP's knowledge efforts are channeled primarily through the Knowledge Hub and through own-managed grants as part of each of the thematic and priority programs.

4.3.1. Knowledge Hub

The Knowledge Hub is a joint effort of ESMAP and the Energy and Extractives GP that focuses on producing knowledge and data tools to track progress on SDG7. The Hub has four major initiatives: (1) the SDG7 Tracking Report; (2) the Multi-Tier Framework (MTF); (3) the Regulatory Indicators for Sustainable Energy (RISE); and (4) the State of Electricity Access Report (SEAR).

Among these, the SDG7 Tracking Report and RISE have been particularly important for keeping ESMAP in the global spotlight in terms of energy access and of SDG7, as discussed in Section 3.1 on Relevance. Both products are focused more on an external audience than on the World Bank and contribute to the ESMAP brand.

In 2013, ESMAP began the Global Tracking Framework as a biennial publication, which evolved into the SDG7 Tracking Report. Today, ESMAP has partnered with other custodian agencies for SDG7 to prepare the Report; these agencies, as defined by the UN, are IEA, IRENA, WHO, and the UN Statistics Division (UNSD). ESMAP serves as the Secretariat for SDG7 Tracking and the author for access for electricity; ESMAP also channels resources from donors to other custodian agencies and oversees the quality of the report, given its historical role. SDG7 is the only SDG that has such a joint model. This collaborative effort has been facilitated by the UN designating the roles of each of the agencies but has still required substantial time and diplomacy on ESMAP's part to ensure success. Interviews with the ESMAP team indicate that these SDG7 partnerships have helped support more effective dissemination as well as other joint endeavors, such as on battery storage with IRENA at the recent Climate Action Summit. **This experience has illustrated that the transaction costs for joint knowledge are high, but the payoff is significant.**

RISE has been more outward facing, with limited recognition among World Bank task teams and country clients interviewed. Still, ESMAP has recently begun to create more awareness internally, with some examples emerging. In the Western Balkans, for instance, the renewable energy section of the RISE questionnaire was applied to the six countries, to benchmark clean energy regulations as part of a WBG lending operation. Regional WBG strategies have also been informed by RISE, such as in MENA and LAC, where RISE indicators were used as the basis for identify priority action areas in client dialogue by the EEX GP leadership teams. ESMAP is also seeking to build on its custodian agency relationships for RISE, as well, exploring potential collaborations with IRENA and IEA.

Like the SDG7 Tracking Report and RISE, **the MTF has also played an important role in ESMAP's leadership position on electricity access but has additionally made notable contributions to informing lending operations and policy outcomes at the country level.** Some of these outcomes were discussed above in Section 4.1.2, such as in Rwanda and Ethiopia. The MTF leverages many of ESMAP's strengths: its focus on data and analytics, its linkages to operations, and its home in the World Bank, where it can borrow the expertise of poverty and macroeconomic specialists.

The MTF is an internal partnership between ESMAP and the Bank's Poverty GP, which brings deep experience in survey design and administration. **Interviews suggest that this has been a highly collaborative and productive partnership.** The Technical Review Panel in the Poverty GP reviews all household surveys in the bank used to measure poverty or welfare and because of their engagement with ESMAP, they can review these surveys with an eye to the MTF. This has resulted in incorporating parts of the MTF in countries where the instrument is not being piloted by ESMAP, for example in Malawi and the UEMOA countries in West Africa. This experience illustrates the advantage of ESMAP's position in the Bank and internal partnership: access to larger pools of instruments.

According to interviews and progress reporting, it will be vital to continue to emphasize the ownership of the MTF process and results by country entities (e.g., Ministries of Energy and Education, National Statistics Offices), to ensure that the MTF does not become a one-off activity. More support is needed by countries to adapt the MTF into a more concise and manageable module in existing national household surveys, and thereby ensure sustainability. ESMAP is planning a guidance note to this end, in collaboration with WHO on the clean cooking components.

On SEAR, ESMAP has shown good adaptive management. Rather than sticking to the initial Business Plan proposal to provide updated SEARs in 2017 and 2019, the team recognized that the knowledge was not evolving quickly enough to justify updates in two-year intervals. So instead, the team has prepared three case studies on impact evaluations of projects in Lao PDR, Kenya, and Bangladesh to build the formal evidence basis for access. The team is also smartly capitalizing on the current momentum on clean cooking—given the SDG7 Policy Brief and the new clean cooking fund launched by ESMAP—to pivot toward a state of clean cooking report.

4.3.2. Own-managed knowledge

Individual programs have taken different approaches to knowledge, reflecting in part the extent to which they are Bank versus externally facing; knowledge inception is not a centralized function in ESMAP. In interviews, most programs indicated that they seek to look at the frontiers through their knowledge products or to identify common knowledge gaps across countries and more cost-efficient ways to deliver on those needs.

Some programs have elected to focus knowledge efforts on **major flagship reports and handbooks**, such as the comprehensive *Mini Grids for Half a Billion People* report and Lighting Global and GOGLA's *Global Off-grid Solar Market Trends Report*. Other programs have relied on the instruments they have developed, like ESRF's *Energy Subsidy Reform Assessment Framework* and GGDP's *Geothermal*

Handbook: Planning and Financing Power Generation. ABG Power Reform has published *Rethinking Power Sector Reform in the Developing World*. These are significant outputs.

These reports serve in many ways as compendia of the tacit knowledge and experiences of ESMAP and GP experts. Interviewees in the World Bank pointed to multiple benefits of the preparation of knowledge products by ESMAP's staff: it serves to synthesize and scrutinize experiences, creates a repository of knowledge in ESMAP staff, as well as generates a global public good. ESMAP's knowledge products are largely seen as complementary to those produced by other major international knowledge hubs, such as IRENA, IEA, and SEforALL—often distinguished by how they provide a pragmatic synthesis of operational lessons learned. Indeed, **ESMAP's flagship reports can shape global thinking on a topic**. *Rethinking Power Sector Reforms in Developing Countries* was raised in interviews as a powerful example. Several operational staff also encouraged ESMAP to follow the World Bank trend toward more practical (and less theoretical) knowledge generation, but to still devote some resources to these substantial flagship reports that can push global agendas.

The renewable energy programs have developed **technical guides**, such as on VRE grid integration, and **technology-focused reports** to support the programs' shift into emerging technologies such as energy storage (*Energy Storage Trends and Opportunities in Emerging Markets*), offshore wind (*Going Global: Expanding Offshore Wind to Emerging Markets*), and floating solar (*Where Sun Meets Water: Floating Solar Market Report* and *Handbook for Practitioners*). From the operational side, **many World Bank staff pointed to these in-depth reports on specific technologies or topics—such as on geothermal, energy storage, floating solar, offshore wind, and climate auctions for energy efficient buildings—as particularly influential with clients**. These high-quality products are seen as useful to position the World Bank on the cutting edge for new solutions and to start the conversation with government.

For these emerging technologies, experience has shown that parallel outreach is important to support uptake among both Bank operational staff and their country clients. Interviews with ESMAP staff suggested that country workshops on offshore wind are proving effective in this regard, with an official request for support from Sri Lanka already received. The GFMG program deep dive also illustrated how country, and sometimes regional, workshops can help drive toward operational lending on mini-grids (see Section 4.4.1). World Bank regional practice managers and coordinators urged ESMAP to "go deep" at the country level for technology promotion, in lieu of regional or global events.

Programs also maintain **tools and data**, such as the Global Wind and Solar Atlases, the geospatial planning tool, and the forthcoming global electrification platform. These tools capitalize on ESMAP's cross-regional viewpoint to identify common needs across countries and more cost-efficient ways to deliver on those needs. Similarly, in interviews, multiple ESMAP program staff described an approach to knowledge that identifies a gap in a given country and "piggybacks" on that gap to develop a product that addresses the broader topic for other clients (e.g., on feasibility studies in geothermal). ESMAP staff also felt that their connection to operations helps them better understand the knowledge needs and the types of knowledge that will be usefully received.

Programs also conduct knowledge events, including workshops, World Bank brown bag lunches, attendances at conferences, and webinars. Several programs have also launched communities of practice (CoPs) around challenging topics, including energy subsidy reform and clean cooking, that require more socialization. Through these CoPs, the programs participate in internal and external knowledge events. Although these **outreach conduits were mentioned less frequently as influential** in interviews with World Bank operational staff, presumably staff awareness of ESMAP knowledge products is partially due to internal outreach via these channels.

4.4. A deeper look at ESMAP programs

This section takes a deeper look at three ESMAP programs—the GFMG under the Energy Access theme, the Efficient and Sustainable Buildings program under the Energy Efficiency theme, and the Energy Subsidy Reform Facility. It seeks to answer three key questions, among others: How do different ESMAP pathways of support combine to facilitate outcomes and impact in the programs (e.g., global knowledge, technical assistance, cross-support to operations)? What factors shape ESMAP's ability to craft and evolve a program and co-produce innovative solutions with operational staff and country clients? To what extent does the program have transformational or ideational impacts on the WBG and outside of the WBG?

These "deep dives" draw on the activity- and country-level analysis, as well as a review of other activities approved and active during FY17-19 and program progress reports and knowledge products, and more extensive interviews with the ESMAP Secretariat and numerous internal and external partners.

4.4.1. Global facility on mini-grids

Context, drivers and barriers

Green mini-grids emerged as a key component for achieving universal energy access with the launch of the Sustainable Energy for All initiative in 2011. An estimated 450 to 580 million people could be connected to mini -rids based on least-cost planning, according to the IEA, ESMAP, and Bloomberg New Energy Finance, out of 1.22 billion people requiring access by 2030. Since 2011, donor-supported programs have piloted numerous green mini-grid projects in Sub-Saharan Africa, Asia and LAC, experimenting with different institutional and delivery models. Simultaneously, a private sector-driven solar PV mini-grid model started to emerge in Kenya, funded by owner capital and grant money and driven by the ICT revolution of mobile payment solutions, technologically advanced monitoring and metering software, and the reduced cost of PV technologies. A combination of falling costs, new technologies and a growing interest of the private sector--bolstered by awareness-raising events organized by the international community, and the imperative to achieve universal access by 2030--has led to **a growing recognition of the critical role of mini-grids in filling the gap between expensive grid extension and solar home systems**.

Although mini-grids have evolved from being a niche solution five years ago to being deployed more widely, **they continue to be underrepresented in national electrification strategies, and their scaling is**

progressing at a slow pace. An impediment to scaling is that delivery models appear to be heavily influenced by political economy factors and incumbency of institutions, precluding the roll-out of one specific model. As a result, mini-grid models often are hybrids or a layering of existing and new institutions and are aligned with prevailing norms and practices in a country. Mini-grids are still struggling with legitimacy, i.e., alignment with accepted norms and practices, especially with regard to the role of the private sector and the allocation of risk and subsidies. Mini-grid delivery models include: the publicly owned utility model, the private micro utility and distributed energy services companies (DESCO) models, community model, public-private partnerships or hybrid model, concessions, and the cooperative model (see Box 4-6 for examples).

Several factors are hampering mini-grids' progress. Foremost is that as a decentralized energy generation form, mini-grids do not fit well within the dominant paradigm of electrification through grid-connected and centralized generation. Rolling out mini-grids at scale requires a reconfiguration of institutions responsible for rural electrification, especially rural electrification agencies and distribution utilities, but also the development of mini-grid specific legislation and regulations. Basically, mini-grids require a new institutional framework for their planning, financing and implementation, a task that is complicated by the existence of different delivery models.

Second, although mini-grids are a least-cost option for rural and remote areas, they are not commercially viable as mini utilities, except for models involving an anchor load with cost-reflective tariff. While cost-reflective tariffs for mini grids make them more economically viable, these are often politically difficult in countries where there is a uniform national tariff. Mini-grids therefore require subsidies, just like rural grid-connected customers are cross-subsidized by urban and industrial customers, and just like national utilities receive subsidies for main grid expansion. Determining the right level and type of subsidies is site- and context-specific and requires good data, while extending subsidies to the private sector lacks legitimacy in some political economies. The fact that most mini-grids require subsidies has also led some governments to question the private sector model and to prefer to build the capacity of their utilities rather than build up the private sector. Yet the private sector-led model offers the prospect of significant cost reductions and innovation, as well as private sector investment that would benefit the balance sheet of utilities and the sector as a whole. Furthermore, mini-grids make main grid expansion more economically viable because they develop demand for high-quality electricity services in areas where the grid will reach within the medium term.

Furthermore, the low economic viability of mini-grids is affected by low utilization, as legacy mini-grids built over the past decade have focused primarily on connecting households without a strategy to increase demand, particularly during the daytime. A fourth factor is that in most of the key electricity access deficit countries, it is difficult to do business, and the existing legal and regulatory framework for mini-grids leaves investors open to avoidable risks. Fifth, funding remains a constraint, and scaling up mini-grids requires a scaling up of funding.

BOX 4-5. EXAMPLES OF MINI-GRID DELIVERY MODELS IN ESMAP-SUPPORTED COUNTRIES

In Nigeria, the electricity market has been privatized since 2005, and utilities have not provided an adequate service, resulting in the widespread use of diesel gensets. The government has opted in NEP for a BOO mini grid model with flexible subsidies enabled by a supportive policy framework for mini grids. The first mini grid project was commissioned four months after NEP became effective. A cohort of nine qualified mini grid developers are working on a collective portfolio of more than 400 projects under the performance-based grant program, another 150 mini grid sites are bid out under a performance based, minimum subsidy tender. In contrast in Kenya, distribution has not yet been liberalized,* and the state utility has made a big push to extend and densify the grid leading to an increase of the electrification rate from 22 percent in 2010 to 75 percent in 2018. It also operates a number of large isolated grids. The mini grid model opted for in KOSAP by the government is a hybrid model of a PPA for generation, a service contract for O&M and a transfer of all assets to the state utility after 7-9 years, further strengthening the incumbent utility, and limiting the role of private developers. Political economy factors and past legacies notwithstanding, institutions do change under pressure and as a result of new ideas and information, and more successful models are likely to spread to other countries.

Internally in the World Bank, and despite a growing portfolio of projects with mini-grid components, skepticism remains about the feasibility and viability of mini-grids, especially at management level. The small size of mini-grid projects, the lack of a successful delivery model, and lack of operational knowledge and experience of mini-grids constitute a further disincentive for country teams and managers. Some Regional Practice Managers are therefore proceeding quite cautiously with testing mini-grids on a small scale before committing to scaling up. While mini-grids are now routinely considered in an electrification strategy and project, their full potential has still not been realized because of these factors. Nonetheless, promising signs are coming from some larger-scale efforts focused on the public-private partnership (PPP) model in Nigeria, Myanmar and Haiti, where ESMAP provided significant support, and where success would demonstrate that mini-grids can be developed cost-effectively and at scale.

Program approach and results to date

In 2016, ESMAP, with funding from DFID, started up the GFMG comprising two pillars: (1) investment/operational support and (2) global knowledge development and learning. The GFMG has the objective to mainstream mini-grids in the Bank's lending operations and to scale solar hybrid mini-grids in the client countries.

Pillar 1: investment/operational support

The GFMG uses a suite of tools and activities that provide support to World Bank projects and client governments to address barriers, as described below. Geospatial analysis addresses the integration and planning barrier—i.e., to fully integrate mini-grids into electrification strategies and planning to enable

their full potential to be realized. The country operator survey reveals the mini-grid development capacity in a country prior to implementation but is also an engagement tool, and a tool to track performance of the sector. Pre-investment activities address a range of barriers, including that of the delivery and financing model, and regulatory barriers, as well as the siting and sizing of mini-grids, without which designing and implementing a mini-grid component would not be feasible.

Scaling up, including of funding, is supported by working closely with operational teams. The GFMG is working with project teams to bring in additional financing to support the scale-up of the mini-grid components of their projects. For example, a "pitch deck" was prepared for the Nigeria project and presented, alongside the Rural Electrification Agency (REA), the project's potential to investors at a major conference in London. In Haiti the GFMG is helping the project team to collaborate with development partners (Inter-American Development Bank [IDB] and Caribbean Development Bank) as well as private sector investors to bring in significant additional financing. The potential for creating "pitch decks" for key investment-ready projects and providing support to project teams for investor "road shows" like what was done for the Nigeria project is under consideration.

- **Geospatial analysis.** Two kinds of geospatial analyses are supported: (i) national least cost electrification planning and (ii) mini-grid portfolio planning. For the first kind, GFMG's support aims to ensure that mini-grids are represented in the analysis, such as in Kenya. In Nigeria, the GFMG has heavily invested in the second kind. The analysis has resulted in a portfolio of 257 mini-grids of which 57 are tendered. In Niger, the Bank task team elected for the second option, but unlike most other cases, no GFMG expert was attached. Countries where geospatial mini-grids planning is planned or on-going are Haiti, Burundi, Cameroon, Indonesia and Myanmar.

  In the initial phase the GFMG focused its resources on supporting preparation and implementation of mini-grid programs in countries with significant scale-up and replicability potential, and on developing and testing a portfolio approach to mini-grids. The NEP (Nigeria Electrification Project) and K-OSAP (Kenya Off-grid Solar Project) are two landmark programs for this type of scale-up. Yet despite the relative prominence of mini-grids in K-OSAP, in real terms the number of households that are estimated to be connected through mini-grids in Kenya according to the Kenya National Electrification Strategy (KNES) is only 38,661. In contrast, several other studies find the figure of between 660,000 and 2.1 million connections, representing 17–58 percent of the non-electrified households in rural areas[26]. This suggests that the geospatial planning tool, while valuable, is very sensitive to assumptions made of pricing and demand estimation. This illustrates why it is important to have GFMG support in high-level planning in order to ensure that the latest mini-grid related data

[26] NewClimate Institute, November 2019. The role of renewable energy mini- grids in Kenya's electricity sector. Evidence of a cost-competitive option for rural electrification and sustainable development.

and assumptions are included, especially where electrification plans are focusing on least-cost electrification only.

- **Country operators survey.** ESMAP's mini-grid operator survey is being implemented where there is demand for it from World Bank clients and a significant cohort of mini-grid operators present. Surveys for Rwanda, Mali, Kenya, and Nigeria were put on hold for a variety of reasons: the government was not interested (Rwanda and Kenya); security concerns (Mali); and, prioritization by the project team to help developers identify promising sites (Nigeria). Countries where operator surveys are completed or ongoing are Cambodia, Myanmar, Cambodia, Nepal, Tanzania, Niger and India. In Myanmar, the survey helped inform the task team and government on the role of mini-grids in the power sector. It brought facts to the anecdotal information that mini-grids were widespread in Myanmar, strengthening the mini-grid component under Myanmar National Electrification Project (NEP).

  On a global level, the set-up of the surveys is helping the GFMG team in the dialogue with the AMDA around how to track progress of the national mini-grid industries in Africa. Nigeria is one of the possible countries where the AMDA will adopt the survey to report out on industry wide performance indicators.

- **Other pre-investment work.** This includes (pre-)feasibility studies, assessments, business plan and model development, and project preparation support. Countries where pre-investment work is completed, on-going or about to start are Liberia, Ghana, Niger, Ethiopia, Indonesia, Burundi, Malawi, Guinea Bissau, Sierra Leone, and the Sahel countries (regional).

  The prefeasibility study in Niger directly informed the design of five new pilot activities as well as the hybridization of existing diesel-based mini-grids. In Kenya, the GFMG provided comments on draft regulations, many of which have been incorporated into the current draft. Other pre-investment activities include: a feasibility study for Liberia that directly informed the design of the large mini-grid to be built there; a mini-grid assessment in Ethiopia that is helping shape the scope and scale of the mini grid component of a large World Bank pipeline project; support to the preparation of a mini-grid component in Burundi that is helping shape the investment strategy for mini grids; and, numerous reviews of Project Concept Notes, including for Nepal, the Philippines, Vanuatu, Indonesia, and the Solomon Islands, that helped shaped project design.

- **Rapid response work.** Regulatory and legal framework support is a key part of the GFMG's "rapid response" work. The team worked directly with regulators to help shape regulations in Tanzania, Rwanda, and Haiti, and provided comments that have helped shape regulations in Zambia, Nigeria, Myanmar, and Kenya. The knowledge developed from these interactions has been captured and reported in the *Mini Grids for Half a Billion People* book. Additional in-depth knowledge on mini grid regulations from experience and research have been captured and reported in a technical paper *Mini Grids and the Arrival of the Main Grid*, six country-specific case studies which will be published as a companion volume to *Mini Grids for Half a Billion People*, and a large in-depth report on mini grid regulations completed by Castalia based on field research in six countries that is being prepared for publication.

The GFMG team works directly with project teams not only to help them prepare effective mini-grid components, but also to help them make those components successful. Four prime examples are close collaboration with project teams in Rwanda, Haiti, Myanmar, and Nigeria (see Box 4-7). In Indonesia, direct support from GFMG to shape the project concept note, along with a case study published as part of *Mini Grids and the Arrival of the Main Grid*, have helped the project team move forward with a significant mini-grid investment (in the pipeline). The task team has submitted a grant request to ESMAP for prefeasibility studies, strategy and business model planning, and stakeholder workshops.

BOX 4-6. GFMG COLLABORATION WITH PROJECT TEAMS

In **Rwanda**, the GFMG experts helped draft and finalize a 2nd generation simplified licensing framework for mini grid developers as well as the development of technical standards. Both the technical standards and licensing framework were recently formally adopted by the Rwanda Utilities Regulatory Authority.

In **Nigeria**, the GFMG team supported the Bank operational team to launch a mini grid tender using the Odyssey platform, including support for the geospatial mapping and on-site surveying of potential mini grid sites to develop investable portfolios of mini grid sites.

In **Myanmar**, the significant involvement of the ESMAP GFMG team (both through support to regulation and the implementation of a GFMG workshop to accompany a lending operation) is credited with contributing to the success of the National Electrification Project (NEP). Specifically, GFMG's support to finalize the tripartite agreement helped in establishing an enabling environment for mini grids. To date, the NEP has completed 37 solar mini grids benefiting 5,158 households, 96 public facilities, 2,197 streetlights and 953 productive end users. These serve about 110 productive energy uses, including agro-processing, cold storage, water pumping, restaurants, etc. Another 26 mini grids (including solar, hydro and biomass) are in various implementation stages (under the second call for proposals), and a third call is currently underway.

In **Haiti**, GFMG experts have been embedded with the project team, and helped design and implement the first request for proposal (RFP) for private sector mini grids in the country. The early success of this process has supported the preparation and finalization of the tri-partite agreement, which is now used in the recently launched mini grid tender has led the project team to begin preparation for a second RFP, which the GFMG will also support, and which gained larger financing commitments from IDB and Caribbean Development Bank.

- **Overcoming the viability gap.** A significant portion of the GFMG's engagement with both World Bank colleagues and their clients revolves around elaborating, clarifying, and justifying the need for subsidizing mini-grids in order to support the scale up of the market and allow it to reach its full potential. This is clear from the GFMG's extensive engagement and support to AMDA, who ESMAP has consistently engaged at events, to help provide AMDA with the opportunity to make a strong case for subsidizing mini-grids to both Bank colleagues and government representatives. In addition, ESMAP and the World Bank have published several publications on the true cost of electricity from the main grid in World Bank client countries, including the forthcoming *Mini Grids for Half a Billion People*.

  GFMG research on mini-grid costs, subsidies, and the role of the private sector is currently shaping the strategies of a number pipeline mini-grid projects, including: Burundi, Ghana, Papua New Guinea, and a regional program in the Sahel countries. In parallel, the GFMG is already partnering with other entities to raise, analyze, and address these issues, including a formal partnership with AMDA, and serving on the steering committee of the Mini Grid Funders Group and the Mini Grids Partnership (now part of SE4All), and is exploring additional relevant partnerships. GFMG knowledge

events and products consistently focus on the viability/cost/funding/revenue gap. As part of planning for the next business plan, the ESMAP Access team is preparing a proposal to further engage on productive uses/demand stimulation/efficient appliances.

Pillar 2: Global knowledge development and learning

Although the knowledge pillar is presented as a separate undertaking, it is very much intertwined with the operational work, as the knowledge products and events are directly supporting operations, and knowledge work is tested in operational settings and is derived from operations.

- **Action learning events.** Action learning events are organized annually by ESMAP in partnership with the CIF; these form an integral part of the dialogue between the World Bank and client governments, and countries are carefully selected to participate in this dialogue. In Kenya, the event was part of the consultative process in preparation of KOSAP. In interviews, this event was credited with helping senior government and World Bank leadership buy into the idea of mini-grids, in part because of the more than 150 participants from all over the world showing progress on the ground. The event helped set the stage to have the mini-grid component become the largest investment component (US$42 million) under KOSAP, and at that time the largest ever in Africa. In Myanmar, the event served to give visibility to the downplayed mini-grid component. With 300 attendees including key government officials, the component could not be ignored. The GFMG Workshop hosted in Nigeria (in which 600 people participated) was directly linked to the preparation of the next-largest mini-grid investment component (US$255 million), and raised the profile for this component, given ESMAP and the World Bank's convening power, which brought together a very wide range of local and international public and private sector stakeholders. As a result, the recently launched private sector-focused mini-grid component saw significant mini-grid developer interest for both of its financing windows (Minimum Subsidy Tender and Performance-Based Grant). The success of this program has also directly led to the preparation of a US$200 million project by the AfDB, which mirrors the components of the NEP almost entirely.

  The most recent event was held in Accra, Ghana, in June 2019. The event brought together around 300 key stakeholders from the public and private sectors, including investors and development partners. The event saw the launching of the executive summary of *Mini Grids for Half a Billion People*, and directly shaped the design of a World Bank project – currently under preparation – that will invest significantly in mini grids to help Ghana be the first country in Sub-Saharan Africa to achieve universal access to electricity.

- **Knowledge products.** With the significant numbers of smaller knowledge pieces being prepared by the GFMG, it was decided to publish one flagship report and handbook plus supporting case and country studies. Through this focused publication, ESMAP and the Bank could put its full weight behind it. The *Mini Grids for Half a Billion People Handbook* is currently under finalization and expected to be completed in the winter of 2019-2020. In addition, another essential GFMG report is the *Mini Grids and the Arrival of the Main Grid*, which presents case studies from Cambodia, Sri Lanka and Indonesia.

All the GFMG knowledge on mini-grids to date has been synthesized in the book *Mini Grids for Half a Billion People*. After the launch of the executive summary of this book, the GFMG has already received requests to present the report and its key findings at four major events (one in Nigeria, two in London, and one in Spain). This indicates a high level of demand for both country-specific and sector-wide workshops.

In addition, two LiveWire publications were produced: "Ensuring That Regulations Evolve as Mini Grids Mature" and "Investing in Mini Grids Now, Integrating with the Main Grid Later: A Menu of Good Policy and Regulatory Options."

Impacts and lessons learned

Since 2013, the World Bank's portfolio of mini-grid investments has increased by an order of magnitude: from US$67 million in 2013 to US$674 million in 2019, including only the mini-grid components of approved WBG operations. India, Nigeria, the Democratic Republic of Congo (DRC), Rwanda, Ethiopia, and Bangladesh—all countries with a large electricity access deficit—have given mini-grids a prominent place in their national electrification strategies. Today, 33 projects with mini-grid components are under implementation and 13 projects are in the pipeline, totaling an investment of US$1 billion, of which International Development Association (IDA) lending is over US$785 million. The number of mini-grids built by lending operations stands at 62, but this number is expected to increase rapidly as major projects start implementation.

In interviews with private sector and non-profit stakeholders familiar with ESMAP's role, this growth is partially credited to ESMAP GFMG as a result of continued engagement and cross-support to operational teams, as well as its broader ongoing engagement with the EEX GP lending teams to raise awareness of the availability of GFMG resources. The results achieved under conditions of continued resistance and constraining factors are impressive.

ESMAP's country support has evolved in two primary ways to help deepen its impact. First, the GFMG has increased its engagement with project teams by "embedding" one or two experts on key project teams, to help provide better real-time support. This approach is based on the successful example of Lighting Africa/Lighting Global. **Expert engagement with country teams and client governments appears to be a key factor in ensuring that mini-grids are not downplayed.** Financing a study without expert engagement has much more limited chances to result in comprehensive momentum. **The GFMG has a much higher ratio of own-managed work to grants than the other ESMAP programs; this deep dive has shown this to be an effective approach for this program**.

The Nigeria project best approximates the ideal of a mini-grid lending operation, on account of its scale and delivery and financing model. If successful, the Nigeria project will have a big impact, and is likely to influence the perception of managers and country governments and lead to replication. The Nigeria project also demonstrates the high impact of ESMAP's own managed grants, i.e., of embedded staff and GFMG consultants.

The GFMG team learnt from Kenya that it is important to involve all stakeholders in the planning process. The initial round in Kenya and Ethiopia did not include the feedback of the mini-grid sector, but this is now changing not in the least because of the establishment of AMDA.

Second, **the team is focusing less on support for pilot-scale projects and more on activities that can dramatically scale up mini-grids**, using the knowledge gained over the past several years. This means helping projects take a portfolio approach to developing mini-grids, incorporating the latest cost-saving technologies and strategies, with an emphasis on increasing the productive uses of electricity, which is seen as essential.

In view of the enormous financing gap for mini grids, development partners need to bring in private and public sector investment to increase the amount of funding available for mini grids by an order of magnitude. This means going from $28 billion invested cumulatively today, to almost $220 invested cumulatively by 2030. ESMAP's approach, drawing attention to mini-grids, through country knowledge events, seems to show some effectiveness in attracting more resources.

4.4.2. Efficient and sustainable buildings

Context, drivers and barriers

The buildings sector is one of the main consumers of energy and resources, using about 35 percent of global energy (and 60 percent of electricity). The sector emits approximately one third of greenhouse gas (GHG) emissions. According to the IEA, "enormous potential remains untapped due to the widespread use of less-efficient technologies, a lack of effective policies and insufficient investment in sustainable buildings."[27] In fact, the speed of energy intensity reduction in buildings has slowed down, and energy efficiency policies and investments are not keeping up with rapid growth in construction and with increasing demand for cooling and other energy services in emerging economies.[28] Stringent building codes and energy efficiency standards for appliances and other electrical devices are lacking in many regions or are lacking enforcement.[29] Global energy efficiency investment grew only marginally in 2017 (up by 3 percent to US$236 billion), according to the IEA. Since 2015, improvements in global energy intensity have been weakening each year, and progress on policy and investment remains flat.

Despite the recognition of energy savings as the "first fuel" and the well-established potential of energy efficiency, the issue suffers from low visibility compared to renewable energy and energy access. It is often seen as an austerity measure, as "doing more with less," especially in developing

[27] Dulac, J., Abergel, T., & Delmastro, C. (2019). *Buildings. Tracking Clean Energy Progress*. Retrieved from International Energy Agency: https://www.iea.org/tcep/buildings/

[28] International Energy Agency. (2019). *Energy Efficiency: Buildings*. Retrieved from International Energy Agency: https://www.iea.org/topics/energyefficiency/buildings/

[29] International Energy Agency, IEA; International Renewable Energy Agency, IRENA; United Nations Statistics Division, UNSD; World Health Organization, WHO. (2019). *Tracking SDG7: The Energy Progress Report 2019.* International Bank for Reconstruction and Development / The World Bank.

countries that are focused on increasing energy use and where energy needs are still unmet. One of the reasons is the perceived lack of clear and measurable benefits for clients, for which metrics and analytics have not been clearly adapted to the context of developing countries. The lack of interest of governments is reflected in the very low number of NDCs with specific energy efficiency commitments. To get energy efficiency back on track, the Three Percent Club, a new coalition of countries, businesses and international organizations committed to driving a three percent global increase in energy efficiency each year, was launched at the UN Climate Action Summit in New York.

WBG financing volume

WBG energy efficiency (EE) financing, demand-side only, totaled US$3.6 billion between 2010 and 2019. Total EE lending represents just under 10 percent of energy lending, and demand side is only 23 percent of total EE. After hitting a high of almost US$2 billion in FY2011, annual WBG commitments towards EE dropped below US$1 billion per year in the four subsequent years.[30] In demand-side EE, the industrial sector is the largest volume recipient at 46 percent, followed by the public sector (30 percent) and residential (18 percent). The non-EEX GP EE portfolio totaled US$2.05 billion between 2010 and 2019, with annual lending volumes varying. The lending volume in 2018 more than doubled, but it is unclear whether that is a trend or due to a few large or special projects. Practices where there has been growth in EE lending are urban and water.

The World Bank has recognized energy efficiency as "the first fuel" and has adopted a Climate Change Action Plan (CCAP), which states that at least 50 percent of the its infrastructure operations in urban space shall integrate energy efficiency and that the WBG shall achieve at least US$1 billion in investments. In 2018, EE lending surged to just over US$400 million. According to Bank staff, much of this is due to ESMAP's efforts.

Energy efficiency has a lot of low-level barriers, and the building sector is particularly complex and fragmented institutionally, which has made replication and scaling a challenging proposition. There is no one-size-fits-all approach or delivery models that can be rolled out everywhere. There are market failures on both the demand and supply side of energy efficiency due to lack of incentives, finance, and capacity. Achieving the SDG7 energy efficiency targets needs leadership, and deep and long-lasting support to human, institutional and financial facilities given the need for many small-scale investments needed to achieve scale.

Two developments that are having a positive impact on EE are the growing leadership of cities in addressing climate change and supporting the green buildings agenda, and better and much faster data collection and access to baseline data and energy saving data as a result of digitalization.

Furthermore, the efficient cooling agenda has risen on the political energy access agenda as a result of the adoption of the Kigali amendment to the Montreal Protocol to reduce the production and

[30] Energy Sector Management Assistance Program. (2018). *Annual Report 2018.* World Bank Group.

consumption of potent greenhouse gases used for cooling, alongside improvements in cooling efficiency, and subsequent launch of the K-CEP program. Sustainable cooling has emerged as an important development challenge, underpinning several SDGs, including SDG7, and as a key area to address climate change (both adaptation and mitigation).

Program approach and results to date

ESMAP program

ESMAP responded to these challenges with a new Efficient and Sustainable Buildings window established in 2016, adopting a cross-sectoral and integrated approach, working with different parts of the Energy and Extractives GP, other World Bank GPs, and the IFC. It supports EE and its integration with renewable energy and other sustainability aspects in buildings (including building construction and retrofitting, energy use in buildings by appliances, and the impact of spatial planning and building location on energy use). The window comprises two components: (i) grants for technical assistance, which provide financial and technical support for WBG task teams across GPs and IFC; and (ii) own managed activities for global coordination, knowledge development and knowledge sharing.

Under Component I, the approach has three elements: (i) develop delivery models and financing mechanisms to scale-up EE; (ii) Create an enabling policy and regulatory environment for EE; and (iii) Integrate EE in projects across sectors (urban, water, transport, etc.).

Internal constraints

Several WBG interviewees suggested that a main barrier is the bias against smaller projects in the Bank, with many EE demand-side projects not seen as big enough for country directors to approve. This has essentially affected the ability of ESMAP to boost EE demand-side lending in the EEX GP. ESMAP's ability to scale EE lending is also affected by regional trends in Bank lending. Apart from ECA, regions where there are significant opportunities for demand-side EE have seen a decline in their lending, such as in East Asia and South East Asia. In LAC lending volumes are also down, although there have been two large EE projects, one in Brazil and one in Mexico. However, growing interest in EE in Africa is creating opportunities for ESMAP to provide upstream technical assistance and influence Bank lending.

Another focus of the program has been to integrate EE in other practices. **Yet working across practices faces structural barriers in terms of identifying opportunities, tracking results, budget management and prioritization, and transaction costs are very high.** Although integrating EE in urban projects, in particular housing and urban planning, may seem straightforward, in reality, the drivers are very different. In the urban practice, there has been more emphasis on earthquake and extreme weather events proofing and resilience rather than reducing energy bills. Bank lending is already subject to many corporate requirements, including climate and disaster risk screening and gender, so there is reluctance to adding more layers of requirements and complexity to projects such as EE when this is not a specific aim of the project, which may be perceived as an additional burden by both Bank clients and task teams.

EE integration in urban is therefore heavily influenced by interest from the client in green building, or when EE is seen as supportive of other priorities. The prospects of increasing EE in the water practice are better, because the drivers are more aligned. In Water there are common drivers in terms of efficiency gains and improvement of service delivery and access.

Because of the absence of tags in the World Bank operations portal for buildings and cooling, there is no systematic way to identify World Bank operations – which inevitably will be found across GPs – that involves building or cooling. Thus, the ESMAP team has to screen the World Bank pipeline in other practices like Urban, Water, Health and Agriculture, to identify relevant projects, and then gauge interest for integrating EE for each identified project by engaging with teams at the regional and country level. This is a very resource intensive undertaking. In many cases, sustainable buildings and cooling will form part of an engagement as opposed to stand-alone projects, necessitating efforts to find the most appropriate entry points and to maximize synergies and complementarity with other country priorities.

Consultations with task team leaders (TTLs) from different GPs at the start of the program also revealed a lack of awareness about the benefits of EE and/or how to effectively integrate EE considerations in buildings-related operations and dialogues. Even within the EEX GP, EE operations are generally considered as more complex and often more time-consuming to design, creating a disincentive to engage in EE despite its positive effect in helping cost-effectively address peak load demand. Many clients are also not aware of the benefits of EE or the options to structure and finance an EE project.

Strategic approach

Because this is a new program in ESMAP, time had to be invested in assessing the lay of the land in other GPs, to see where the demand was in countries, to understand the opportunities and barriers, and find the regional and country teams that were open to integrating EE in projects. The team had to be opportunistic to build a pipeline of projects that could serve as flagship examples, as a pathway to garner more cross-practice interest. **These considerations necessitated at least an initial focus on countries with known demand and an interested task team.** A special focus was given to develop and pilot approaches that could be replicable and scalable. A main example of the scaling angle is working through intermediaries, e.g., commercial banks as in Panama, or revolving funds, of which there are several examples in the ECA region. Another example is auctioning, for which a pilot is being designed in Indonesia.

ESMAP also invested in tools, in particular the green building EDGE tool, for which it provided seed funding to the IFC green building program. The objective was to develop an accessible tool that could be used widely in developing countries. It renders visible to the market what is green, and it represents a recognition like a label. It has been used in several WBG projects with ESMAP support, including in China, Nigeria, and Argentina.

As part of the search for innovative finance delivery models, ESMAP teamed up with IFC, Urban and Climate colleagues to investigate whether the climate auction model could be adapted to energy

efficient buildings, and is helping to design a pilot for an auction targeting the housing sector in Indonesia, with project preparation funding from the CTF.

In an effort to address the poor image barrier of energy efficiency, ESMAP is working with Oxford Policy Management on re-framing energy efficiency from "doing more with less," to do "even more with more energy," by focusing on evaluating energy productivity, improved energy services, e.g., more space cooling, more refrigeration for foods and medicine, better lit and equipped schools to improve education – all of which promote development (the "direct growth impacts" of EE). The approach is being piloted in a Bank lending operation in Ghana.

In terms of external international engagement ESMAP also joined Global Alliance on Building and Construction (GABC) and organized a joint knowledge event with GABC in Cote d'Ivoire. It was the first event in the country focused on energy efficiency in buildings, and it introduced the EDGE tool and opened the door to a subsequent IFC engagement in affordable green housing. ESMAP facilitated WB participation in the GABC Latin America Round Table in Argentina in FY20. At the invitation of ESMAP, GABC participated in the ESMAP-supported International Conference on Sustainable Cooling in FY20 to help highlight the linkages between cooling and the buildings sector.

With regard to knowledge products, to date the team has focused on developing discrete pieces to address knowledge on particular issues and has not yet published a flagship publication.

Responding to emerging challenges

ESMAP, in collaboration with the Bank's Climate Change Group (Montreal Protocol Unit), established a new multi-sector TA program dedicated to cooling: the ECCP. Administratively, the ECCP is set-up as a sub-task under the Efficient and Sustainable Buildings Program. This program was made possible through seed funding (a grant of US$3 million) from the philanthropic Kigali Cooling Efficiency Program (K-CEP) managed by ClimateWorks.

ECCP is specifically geared towards supporting the design and inclusion of efficient clean cooling components in WBG country engagements, lending, and investments. The program will also develop operationally focused knowledge products and tools, support awareness raising, and facilitate knowledge exchanges. Finally, it will develop strategic partnerships within and outside the WBG and help mobilize funding. The program aims to underpin the Bank's Sustainable Cooling Initiative by supporting a project pipeline. ECCP is providing key input how the Bank engages in this agenda, including global knowledge such as the Global Sustainable Cooling Roadmap, which is under development.

In February 2019, calls for proposals targeting different GPs, as well as the IFC, started to be issued. The ESMAP team has been working closely with task teams on the development of proposals, also facilitating contacts with top experts. The first funding proposals are expected to be approved in early FY2020. ESMAP's ECCP also launched the development of sustainable cooling knowledge products and facilitated/supported knowledge events and training.

Program results

- **Component 1 – Grants for TA.** Between its start and June 30, 2019, the program has informed 10 buildings-related WBG operations that now include energy efficiency components (target is 10). Between its start and June 30, 2019, the program has also informed four country policies/plans/strategies related to buildings (target is 7). As of June 30, 2019, the Efficient and Sustainable Buildings program supports 35 TA activities through grants amounting to US$8,955,000 (including a Swiss State Secretariat for Economic Affairs [SECO] grant of US$4 million for Kyrgyzstan). Most of the grants support TA activities led by EEX GP teams, as well as some in SURR and IFC.
- **Component 2 - Own managed activities, including knowledge development and exchanges.** The Efficient and Sustainable Buildings team has developed five knowledge products and supported two knowledge exchanges. These include three WBG "Livewires" and two studies (one on the climate auction model for EE buildings and the second on assessing and measuring the performance of EE projects). The ESMAP team has also provided in-kind support to WBG lending operations in Albania, India, Kosovo, Kyrgyzstan, Mexico and Turkey, which in turn helps inform the window's overall activities. This support has contributed to the:
  - Development and mobilization for setting up an EE innovation fund for EE/seismic rehabilitation of public buildings in Kyrgyzstan.
  - Development of financing mechanisms for public buildings in the Balkans (Kosovo and Albania); institutional capacity building and implementation of an EE financing and implementation mechanism for municipal facilities in Mexico and expansion to schools and hospitals; and initial preparation of a revolving financing mechanism for EE in the public sector in Turkey.
  - Design of the results framework and M&E systems for the Program-for Results loan for EE Scale-up Program.

  Furthermore, ESMAP provided in-kind support for the activity in Ghana, which focuses on EE in public buildings in Energy Efficiency Investment Opportunities in Africa (P166317, ESMAP activity). This is a regional ESMAP activity aiming at beginning to unlock the EE potential in Africa, which identifies investment opportunities for EE in 3 countries, Ghana, Zambia, and Botswana.

With about one year left in the business period, just over US$2 million remain to be allocated, in addition to another US$2 million for EE buildings-related work under the UK Department for Business, Energy & Industrial Strategy (BEIS)-funded Energy Transition program.

Impacts and lessons learned

The low volume of EE lending and the not fully tapped but challenging to access opportunities for integrating EE across GPs makes it harder for the ESMAP program to be strategic and maintain a strong focus on buildings and on scaling and replication. This is part of the reason for supporting the Vietnam EE lending operation for example, which is focused on industrial energy efficiency, and not urban or EE buildings (although buildings were addressed in ESMAP support to GoV energy efficiency policy development). The dual objectives of scaling up EE and sustainability of buildings and working

across GPs are also somewhat at odds, given the need to be opportunistic under conditions of limited opportunities in the non-energy lending portfolios and the need to quickly build a track record. Now that the opportunities in the Bank are better understood, it is expected that the team will be in a better position to target its efforts and scale up EE in buildings within the Bank's lending portfolio.

The program approach has remained ad-hoc and has not yet developed a replicable delivery model. This reflects to some extent the nature of the sector, which precludes a single approach. Instead several tools, primarily in financing, have been tested and replicated on a small scale, i.e., revolving funds in the ECA region and local commercial bank financing in LAC. An innovative green building auction model is being tested in Indonesia, that is modeled on the Climate Auctions Program of the World Bank, and which offers a results-based approach to incentivizing private sector investments, and uses the EDGE certification as a metric against which to disburse funds. **Much of the work in the buildings window has been focused on the financial mechanisms.** There seems to have been less opportunity to support building codes. The team is well aware of the lack of tools and is discussing the possibility of developing a more standardized toolkit to help task teams to engage with clients to identify the opportunities and benefits, including a communications strategy, guidance on stakeholder engagement in the buildings sector etc. and build a package.

The collaboration with IFC on the development and implementation of EDGE has been strategic and fruitful and could be expanded. The new efficient clean cooling program will provide further avenues to collaborate with IFC and other teams in the Bank.

ESMAP's role and expertise in EE buildings is strongly valued in LAC and ECA and is growing in SAR. In the EE community the model for EE appliances that has been rolled out by EESL in India with support from the Asian Development Bank (ADB) and the World Bank has generated much interest in other countries in the region, who want to know whether the model of bulk procurement would work in their country. ESMAP is looking into organizing a knowledge exchange in India on the experience with the model.

Unlike electrification, where development partner coordination is quite high, the approach to EE at the country level is disjointed and lacks coherence and a higher-level strategic approach. There seems to be a lack of common vision of what partners can do and bring to countries. Baseline data are mostly missing, and demand side EE upgrade plans and policies are missing, although they form the bedrock of improving EE. An example of a different approach is that adopted by the EBRD, which has chosen to focus on policy development, i.e., improved policies to enable private sector investment, which they call "investment grade EE policy."

At the institutional (WBG) level, ESMAP interviewees believe that brown-bag lunches have played an important role in communicating opportunities and replicable models. Meetings at the management level with Urban have also born fruit, but cross-practice collaboration could be more systematic.

4.4.3. Energy subsidy reform

Context, drivers, and barriers

Energy subsidies[31] are a major drain on governments' fiscal resources. Although total spending on fossil fuel subsidies has fallen from US$532 billion in 2014[32], the first full year after ESMAP's Energy Subsidy Reform Facility (ESRF) was launched, to US$427 billion in 2018 according to the IEA[33], subsidies remain a substantial issue (as fossil-fuel prices have fluctuated over that time). Such subsidies are regressive and inefficient, reducing countries' prospects for sustainable development. For this reason, SDG 12c concerns the phasing out of inefficient fossil fuel subsidies. Negative impacts of energy subsidies include:[34,35]

- Undermining of the financial viability of a country's energy sector.
- Overconsumption of fossil fuels leading to distortion of resource allocation, excessive fuel imports, effective reduction of incentives for energy efficiency and renewable energy, and excessive greenhouse gas emissions and other pollution.
- Aggravation of fiscal imbalances.
- Crowding out of private investment and limiting the government's fiscal space thus reducing resources available for public investment.
- Their regressive nature: higher-income energy consumers tend to receive greater amounts of subsidy because they tend to consume more energy than low-income consumers.

Eliminating, or even simply reducing, energy subsidies thus releases funds that can be used for tackling issues such as improving energy efficiency and expanding renewable energy. Hence it makes sense not to consider subsidy issues in isolation from other issues of energy sector improvement.

The main barriers to ESR arise from reform's inherent political and social sensitivity, as well as vested interests. Subsidy beneficiaries may resist reform and can lead to popular backlash or even social unrest if ESR is inadequately designed, communicated or implemented, or is mistimed. Subsidy reform can also

[31] An energy subsidy is defined by the Bank as a deliberate policy action that specifically targets electricity, district heating, or fuel and results in a reduction in the net purchase costs of energy, or in a reduction of the production costs of energy, or an increase in revenues retained by suppliers. The Bank, OECD, and IEA do not include uninternalized costs of negative externalities, such as harmful environmental impacts, whereas the IMF does. This can complicate comparisons between estimates.

[32] ESMAP, World Bank Group. *Energy Subsidy Reform Technical Assistance Facility Factsheet*. Available at: http://www.esmap.org/sites/default/files/Subsidy_Reform%20Fact%20Sheet.pdf

[33] Thomson Reuters Foundation (2019). *Despite climate pledges, G20 coal subsidies rise.* Available at: https://uk.reuters.com/article/climate-change-coal-subsidies/despite-climate-pledges-g20-coal-subsidies-rise-idUKL8N23V32L

[34] World Bank Group. (2017). *ESMAP Business Plan FY2017-20: program proposals*

[35] IMF. (2013). *Energy Subsidy Reform: lessons and implications*. Available at: https://www.imf.org/en/Publications/Policy-Papers/Issues/2016/12/31/Energy-Subsidy-Reform-Lessons-and-Implications-PP4741

negatively impact the poor and vulnerable. Governments are therefore reluctant to engage on the issue, and the subject must be approached carefully. However, interviewees noted that when governments seek assistance with ESR, they commonly look to the WBG given its technical and financial capabilities and existing relationships with government counterparts.

In this context, ESMAP started the ESRF initiative in 2013 to bolster "the Bank's ability to provide a coordinated and comprehensive response to demand for assistance from governments, in a manner that brings to bear the full expertise of the Bank in macro-economic and fiscal matters, poverty analysis and policy, communications and consultations, energy, and social protection" with an explicit reference to SDG12c in its theory of change. Prior to the launch of ESRF, the Bank had undertaken subsidy reform work through responding to ad hoc requests from clients for assistance with isolated issues, e.g., fiscal sustainability, energy pricing, social protection. These requests had, and still do, typically followed an intervention by the IMF.

The ESRF is led jointly by the EEX and Macroeconomics Trade and Investment (MTI) GPs. Its funding is often tied to coordinated multi-GP technical assistance, thereby encouraging collaboration of staff from numerous Bank GPs, drawn mainly from the EEX, Social Protection, Poverty, and MTI GPs. Furthermore, it is through the ESRF that the Bank acts a hub and coordinator for other organizations who undertake research and analysis on subsidy reforms, (notably the IMF, OECD, the Global Subsidies Initiative, and the International Energy Agency), or advocacy (the Friends of Fossil Fuel Subsidy Reform) or act as donors (notably the European Commission).

Program approach and results to date

Program approach

For the FY2017-20 Business Plan, the ESRF proposed to expand its TA to governments and to develop a standardized framework (the ESR Assessment Framework "ESRAF") to assess energy subsidies, in order to ensure a consistent approach to client engagement. Assessing energy subsidies through ESRAF includes assessing their social and economic impacts, examining measures to mitigate those impacts, and considering ways to address political economy challenges through structured recommendations. ESRF acts along two complementary pathways: **technical assistance and analytical work with an operational orientation** and **global coordination, knowledge development, and experience sharing**. The first pathway consists largely of providing **multidisciplinary expert assistance** to governments, which is funded through **grants**, sometimes with a contribution from an ABG or from another thematic window[36], and can be **linked or lead to World Bank lending, frequently a DPF series**. When ABG funds are added, an ESR activity can be expanded to become a comprehensive analytical program on which to base a wider engagement in a country.

[36] In the period under review, 36 ESR activities were funded by grants under the ESR thematic window only, and another 13 were funded by grants under the ESR thematic window in combination with funding other from windows, mainly ABG.

ESRF assistance typically comprises:

- Analysis of poverty, social, fiscal, macroeconomic, political, economic, and climate change aspects of energy subsidy reform.
- Assessment of distributional impacts of subsidy reform at the household and macroeconomic levels.
- Support for building dialogue, communications strategies, and consensus building around energy subsidy reform.
- Support for targeting and delivery of subsidies (e.g., technology-enhanced approaches).

TA is provided by Bank staff, sometimes with external consultants and staff from partners such as IISD as well, under the coordination of a TTL, most often from either the EEX or MTI GP. While ESRF does seek to raise governments' awareness and interest in ESR via Bank country office staff and knowledge work, given the inherent sensitivity of ESR, ESRF does not seek to cajole governments**. Assistance is undertaken only in response to a request from a government.**

The second pathway consists of **developing knowledge products**, ranging from the ESRAF[37] to concise ESR case studies, in association with partners (internal[38] and external[39]); **disseminating those products** to governments and partners through webinars; and providing stakeholders with opportunities for **confidential experience sharing** at events or via the platform of the ESR Online Community (ESROC). In addition to being educational and awareness-raising, the knowledge products and the experience sharing can **encourage governments to approach the Bank** with a request for technical assistance under the first pathway when they feel the need to undertake ESR – a need which may become undeniable during a fiscal crisis and hence be impressed on them at that juncture by the IMF.

Through ESRF, ESMAP and other Bank experts, along with external partners and donors, are able to provide a holistic response over the short, medium and long terms, as required, drawing on wide-ranging expertise in diagnostics, design and implementation of reforms, on pre-existing relations with governments, on the Bank's and partners capabilities in capacity building, and on the Bank's and other donors' ability to finance reforms. **These elements make the Bank's service offering with respect to ESR more robust than it was prior to the launch of ESRF.**

Responding to emerging needs

In its early years, ESRF engaged mostly with middle-income countries on ESR to reduce fossil-fuel subsidies. The flagship examples are the TA activities in Egypt and Ukraine, which began shortly before the launch of ESRF. Over time, **particularly in this business period, ESRF has undertaken more TA in**

[37] ESRAF was developed to guide Bank teams as they engage with clients. It is described by one partner as the compendium of tacit knowledge and experiences of experts across eight GPs.
[38] E.g., the Social Protection GP, Poverty GP , MTI GP, GPSURR
[39] E.g., the IMF, the IISD and donors

low-income countries which need to improve the financial viability of their power sectors, such as Ethiopia and Rwanda. This expansion has been supported by WBG management and operational staff, TAG, and CG members, who see this as an important need and impediment to sustainable energy access for all.

Results

Forty-nine ESR grants were undertaken in the period under review. Grants approved during the business plan represent US$14.6 million of grant funding, the majority of which (US$13.8 million) has disbursed. Based on the activity-level analysis, policy/ strategy informed is the most commonly targeted outcome in GRMs, followed by development finance informed and client capacity increased.

ESRF's TA activities vary considerably in scope and complexity, with the value of the ESMAP grants ranging from US$80,000 to nearly US$1 million. The most recent activities in Egypt, Madagascar, and Ukraine follow on from previous activities within longstanding engagements (stretching back to the launch of ESRF or even slightly before) and concern reform of fossil fuel subsidies, which had not begun at the start of engagement. Grants in Nigeria, Ethiopia, Rwanda, and Honduras are new, having begun in the last couple of years, and concern power sector reform that was underway at the start of engagement. Below, some of the outcome pathways are described, based on the country case studies.

- The **Egypt** engagement began in 2013 with a request for technical assistance from the government. This stemmed from a ballooning of fossil fuel subsidies to 7 percent of GDP caused by rising oil prices and leading to arrears to international oil companies. ESMAP responded by funding a suite of ESRF TA activities to provide analytics, capacity building, and communications support that continued through until closure in 2017. These activities laid the groundwork for programmatic dialogue that led to a $US 3.15 billion, multi-donor Development Policy Loan series as well as a multi-billion dollar IMF program, which were tied to subsequent reforms, including a five-year tariff plan for electricity, pricing reforms for fuel, and a new gas law. These lending operations drew to close within the period under review but have left Egypt in a markedly improved situation. Subsidies represent less than 3 percent of GDP (with a third of the improvement being due to ESR) and fiscal savings have been directed towards social spending which now exceeds energy subsidies. Moving the energy sector into financial viability, combined with incentives from the government, has seen a recent increase in private investment for renewable energy.
- The **Ukraine** engagement began in 2014 with a similar request from the government. In this case, the underlying problem was the disparity between residential and industrial gas prices as well as non-cost reflective tariffs for district heating. ESMAP assistance began with an initial phase of financial, fiscal, poverty and social impact assessments. This was followed by an ongoing campaign to communicate the reform measures (energy tariff reforms, energy saving incentives, social protection measures) to the public. As a result of this support, the government was able to increase tariffs by 470 percent for residential gas and by 193 percent for industrial gas over 2014 and 2015, and then unify gas prices while moving district heating tariffs towards cost recovery levels in 2016. At the same time, social protection coverage went up from 1 million households to 6.5 million

households in 2014-2017. More recently, ESMAP grants have financed diagnostic analyses of the Housing and Utilities Subsidies program ("HUS", the main energy social energy protection program in Ukraine) prior to its reform. These analytical activities supported the design and implementation of measures that reduced the fiscal cost of HUS ahead of the 2018/19 heating season and that replaced the complex, opaque system of non-cash settlements, which was vulnerable to leaks and corruption, with a simple mechanism of direct payments to households known as Consumer Level Monetization. These reforms of the HUS were a key prior action to the US$750 million Ukraine Policy Based Guarantee approved in FY19.

- ESRF TA to **Rwanda** is ongoing. It consists of analytical inputs (modelling, briefs, and presentations) to the development of a new trajectory of fiscal transfers and a policy framework for fiscal and financial sustainability of the power sector. The need for ESR arises from the threat to the financial viability of the power sector through rapid expansion of generation capacity and energy access that are key priorities for the government. ESRF analytics consist of the fiscal impact analysis of the electricity sector, the financial assessment of electricity subsidies, and the assessment of the social impacts of the subsidies, all of which have provided inputs to the preparation of three energy sector DPF operations in Rwanda as well as the government's development policy program. ESRF funding enabled the Government to design its prior actions based on updated financial projections, since the existing information was five years old. Adoption of the fiscal-transfer trajectory became in the main prior action in the Government's reform program supported by the DPFs. ESMAP also conducted a tariff optimization analysis, which the Government credited with helping it gain political support for a quarterly tariff adjustment that was approved in September 2019.
- A new **Ethiopian** Government and Prime Minister recently created an opening for a major DPF series, with one of the key proposals in the first year being tariff reforms in the electricity. ESRF TA thus consists of "just-in-time" analytical work to inform a US$1.2 billion DPF series financed by IDA. This work includes a cost-of-service study, a formal tariffs-trajectory study, and an analysis of utilities' debt restructuring options. The model for estimating costs of supplying electricity that was developed under the assignment is expected to be instrumental to restoring the financial viability of the sector.
- ESRF TA to **Nigeria** consists of analytics and communications support. The initial grant informed the Federal Government of Nigeria's (FGN) Power Sector financial Recovery Program (PSRP) through supporting the preparation of (i) financial analysis of tariff shortfalls over the period 2017 – 2021; (ii) regulatory and institutional analyses; (iii) financial analysis of distribution companies; (iv) high-level generation planning; and (v) guidelines for distribution companies' Performance Improvement Plans. ESMAP's activity was partly funded through an Annual Block Grant as well as by ESRF, given the need for wider engagement covering markets and planning. The follow-on TA is facilitating (through analysis) the building of consensus between different FGN ministries, the regulator and key power-sector agencies that is necessary for the PSRP to be implemented. The TA is also informing a Program for Results (PforR) operation of the Bank, currently under preparation, to support the PSRP. The PforR is planned to include a US$1 – $1.5 billion PSRP based loan to support critical governance, regulatory and policy measures of the PSRP.

Aside from the Bank operations and the PSRP, which have featured the heavy involvement of ESMAP external partnerships (see below), the most significant outcomes have been the decisions of the FGN to facilitate implementation of the PSRP by linking public financing of the power sector with implementation of reforms and also by establishing a high-level institutional structure for implementation oversight.

In Nigeria, internal and external WBG partners have been heavily involved. IFC and MIGA were involved in the preparation of the PSRP, and the Bank consulted the IMF about the PSRP's macroeconomic and fiscal linkages. IFC also helped lead consultations with the private sector. The design of PforR is also benefiting from the involvement of IFC, MIGA, DFID, USAID, JICA, AfDB and the IMF.

Additional ESRF successes are noted in Madagascar and Honduras, although these countries were not part of the evaluation's country case studies. ESRF financed analytical reports through which to provide advisory support to the Government of **Madagascar** for its negotiations with private distributors, which concluded successfully in June 2019. These analytical reports include an update of the Analysis of Pump Price Structure of 2016[40], the Technical Review of the Distributors' Own Price Structure Analysis, technical notes on price structure revisions prepared by the WBG team, and the Madagascar Economic Update. The agreement reached between the Government and private distributors resulted in the effective elimination of all direct fuel subsidies and a plan for clearing liabilities. In **Honduras**, an ESRF TA activity, co-financed by an ABG grant, begun in FY2018 has supported the preparation of a draft regulation to define a cost-reflective methodology for setting electricity tariffs, while including incentives to progressively improve electricity sector performance and limit negative fiscal impacts. The regulation was adopted in June 2019, and utility and regulator staff have been trained in it as part of the TA activity.

Impacts and lessons learned

External partners, government counterparts, and WBG operational management and staff believe that ESMAP's ESRF has led to significant progress on energy subsidy reform. Within ESMAP, the ESRF is almost exclusively financed by preferenced contributions, reflecting the strong priority of donor countries on this topic. Interviews with World Bank EEX GP management acknowledge that these directed contributions have enabled the WBG to be more intense in its activities to address the issues of energy subsidies and help the utilities understand the root of the problem. **Thus, the ESRF has helped make ESR a higher priority within the WBG.**

ESRF's network of multidisciplinary expertise, drawn from several GPs and external partners, is effective, as attested to by several TTLs, Bank staff from other GPs, external partners, and donors.

[40] An analysis financed by ESMAP at the start of its engagement in 2016, which led to the automatic adjustment of pump prices in Madagascar.

Members of the network appreciate the spirit of collaboration[41] within it, and the "safe space to think" that it provides, which has the ideational impact of generating more comprehensive thinking that leads to more coherent policy responses[42] and knowledge generation and dissemination. The multidisciplinary and international nature of ESRF's network is seen as a "unique capacity and strength of the Bank", especially as it provides the basis for the collaboration across sectors that is the sine qua non of successful reform.

Similarly, **sharing experiences across regions (ESMAP's bird-eye view) has been helpful for building the appetite for reform**. And successful implementation of ESR in one country can awaken the appetite for ESR of countries in the same region. In the words of one interviewee, following ESMAP support, "almost the whole region is talking about moving from general, wasteful subsidies to support mechanisms targeted for the poor and vulnerable."

Feedback was more mixed on the usefulness of the ESRAF, at least within the EEX GP. Several regional practice managers and coordinators felt that the ESRAF was less useful from an operational perspective; in other words, that the Framework was not prepared with World Bank task teams who are familiar with subsidy and pricing reforms as the core audience. Still, interviewees recognized that the ESRAF has helped with ESMAP branding, with showcasing the depth of Bank knowledge on the topics covered and the fact that the Bank can support the reform process with broad cross sectoral expertise, and by consolidating knowledge within the ESMAP team through the knowledge generation process. This feedback notwithstanding, the volume of downloads of ESRAF good practice notes is evidence for the demand for the useful information that they provide, and ESRF is undertaking not just to develop deeper diagnostics but guidance on how to operationalize the best practices and knowledge collected within ESRAF.

Due to the sensitivity of ESR for governments, **establishing trust with government counterparts is particularly important.** This takes time and sustained relationships between the WBG and counterparts, which the ESRF can support. Governments in fuel importing countries tend to undertake ESR when global fuel prices are rising and backslide when global fuel prices are falling. Interviewees felt that the opportunities for medium- and long-term engagement with a country that ESRF provides, as well as short-term engagement, are essential to success. GRM lessons learned also indicate that as government decision makers on ESR preparation and implementation occupy positions in a wide range of ministries and agencies, having a mechanism chaired by a senior government counterpart is important for coordinating these dispersed decision makers. Engaging local experts on a TA activity can also improve acceptance of difficult messages by government counterparts.

ESRF's approach of monitoring DPF operations in preparation to identify opportunities to contribute to design sustainable ESR has been effective. Through this early monitoring, the ESRF team is able to

[41] ESRF is due credit for maintaining collaboration among partners who share a goal but have somewhat differing priorities.

[42] Working on these policies provides members of the network with opportunities to learn (an ideational impact) and thus enhances the network (a transformational impact).

inform DPF teams of the ESRF resources that could be used to prepare their DPFs with some ESR TA, thereby encouraging them to recommend ESR more strongly to clients. This approach is also facilitated by ESMAP's agility, as **the speed with which ESRF granted TA resources was noted as critical to success in several countries**, including Egypt and Ethiopia.

External and internal interviewees also emphasized that the communications/ political economy dimension of ESR is seen as becoming increasingly important. Communicating the rationale for ESR measures to the public is crucial. Attempting ESR "in a technocratic way" will lead to the public rejecting it. In Ukraine, for example, the communications support has been highlighted as the essential factor, as the steep tariff increases did not result in any significant popular backlash but rather were accepted with a dramatic rise in uptake of social protection measures.

4.5. Key lessons for effectiveness and sustainability

This section synthesizes key lessons across all three lenses of the evaluation's approach: the activity-level analysis, country case studies, and program deep dives. It reflects on key drivers and barriers influencing the achievement or non-achievement of ESMAP's outcomes.

ESMAP's knowledge products, its data work, and its technical assistance for project preparation and design often act as mutually reinforcing pillars. In Bangladesh, for example, ESMAP knowledge has formed an essential part of the grants, in particular in clean cooking and mapping and scaling renewable energy. In Kenya, Ethiopia, and Nigeria, ESMAP-supported geospatial electrification planning in combination with the MTF program have played a critical role in changing mindsets around energy access and launching national electrification strategies, which ultimately informed World Bank lending operations that received additional preparation support from ESMAP (e.g., through Lighting Africa). Also, in Ethiopia, ESMAP's 2016 study on the financial viability of African power utilities was noted as particularly "eye opening in conversations with counterparts," in the words of one World Bank interviewee. Rwanda offers a further example of the importance of ESMAP data and analytics to support policy change. The Government of Rwanda committed to a quarterly electricity tariff adjustment in 2019, as a prior action in the energy sector development policy lending series. A government representative explained the role of ESMAP:

> *"The beauty of [the ESMAP assessments] was that we could convince the decisionmakers on the tariffs. Before it would have been a political decision without justification. With the analytical work with the support of ESMAP, we were able to highlight the challenges the utility faces, and that helped decisionmakers agree to the quarterly tariff adjustment. It enlightened decisionmakers with data, which they did not have before*."

Another ingredient for success is ESMAP's ability to bring to bear its experience from one country or region to another, as well as its cutting-edge expertise. For example, by working across many countries and advising on multiple operations, Lighting Africa has amassed significant expertise that it has now leveraged into a more than US$200 million regional off-grid electrification project in West Africa and the Sahel. Lighting Africa is also adapting the knowledge it has gained working in East and South Africa to

support fragile and conflict-affected African states. Beyond Lighting Africa, numerous task teams and regional practice managers and coordinators pointed to individual ESMAP staff as custodians of specific and up-to-date knowledge, and the involvement of those staff as supporting effectiveness. In one case study country, World Bank country management was "extremely impressed" with the quality of the ESMAP team and their active support of task teams. Because World Bank task teams' reach is often limited to their country or region, "to have an ESMAP team with a global purview and mandate to advise teams, and support or even field a mission, that has been instrumental in improving the success factor." This was the case in Bangladesh, for instance, with respect to renewable energy and battery storage. The Rwanda case also shows how ESMAP's bird's eye view can help identify a regional gap (e.g., in use of solar energy for productive uses in agriculture in parts of Africa) and then work through its networks to identify a country with strong support for the activity from the Government and CMU to pilot an approach.

At the same time, several World Bank operational staff questioned the value for money of sharing knowledge through regional events in some cases, given the complexity of the energy sector in some countries and thus the challenge of gaining the participation of the "right" sufficiently influential representatives across many relevant agencies (e.g., ministries, utilities, energy boards, regulators, and so on), as well as the drain on human resources associated with staff attending a proliferation of outside events. This experience was contrasted with the perceived effectiveness of country events and global ones to maintain ESMAP's relevant position. In-country workshops have been highly effective in large and complex markets, such as in Pakistan, where they helped drive consensus around a goal of 20 percent renewable energy by 2025.

In many of ESMAP's programs, a pool of consultants and a framework agreement allows fast deployment of experts where they are needed instead of having to procure them individually. **The quality of consultants' work and the approach matter; the capacity of the clients' also influences these perceptions.** This has been a challenge for certain activities in Niger (see Box 4-3) and Mongolia and was also raised in numerous other activity GRMs as a lesson learned. Conversely, in Vietnam, where the consultants selected had extensive prior knowledge of the country and the power sector reform process, this supported a quality roadmap for natural gas development.[43]

Activities must be appropriately tailored to local circumstances, even if they draw on regional or global experience. In Kenya, off-grid energy access project components that benefited from extensive ESMAP input and analyses in the design phase and were designed bottom up to ensure grounding in local reality were perceived by key stakeholders to have a much higher likelihood of succeeding, compared to project components that were designed with minimal ESMAP input. Several country case studies also pointed to the potential need for **more or continued attention to issues of affordability in low-income contexts**, such as for electric thermal storage in the ger areas of Mongolia and for solar home systems in Niger. Interviewees from the Government and micro-finance institution in Niger

[43] This grant focused on natural gas was approved in FY2016.

expressed concern about the feasibility of the ESMAP-funded business model design, in terms of whether households in rural areas will be able to afford Lighting Global certified products and whether the design can catalyze a market. It is still early in the implementation of the NESAP project, however, and the market is nascent and weak at this stage.

Related to local context, **political economy is a key factor in the power sector due to competing political, economic and social pressures, and should inform ESMAP grants where it is likely to directly affect or slow outcomes.** Understanding political economy is seen as essential for tailoring advice to the local context and adaptive grant management. In some cases, the ESMAP experience suggests the occasional need for deeper diagnostics to better target and prioritize support where it is likely to have greater impact. For example, in Kenya, in the case of the ESMAP-supported geothermal strategy, stakeholder alignment around a strategy has not yet taken place due to competition for resources, contested institutional boundaries, and an inadequate regulatory framework in the sector. Political economy factors can also slow outcomes, for instance, in Kenya, where ESMAP support for the regulator is seen as important to enhance institutional capacity and enable the World Bank to identify windows of opportunity to provide strategic technical assistance, but impacts in the form of detailed regulation and further reform of the sector have been slow to materialize given the political economy. Similarly, in Mongolia, the policy dialogue on needed sector reforms is seen as critical but is time-intensive and progress has been slow. Although tariff-related actions were not included in the ongoing development policy lending series as hoped, policy dialogue will continue. Setting the stage and having analysis available to government when they are ready is seen as important by WBG task teams. In Vietnam, despite active participation by the Government in the process, the Government did not implement the divestiture strategy recommended by the ESMAP-funded study, which interviewees believed was due to the political economy of the electricity sector.

Both the activity- and country-level analyses point to well-sequenced ESMAP activities as supportive of outcome achievement. Several country case studies (e.g., Vietnam, Mongolia, Ethiopia) illustrated that multi-year engagements can drive results, including major government programs and lending operations. In contrast, government interviews in Zambia indicated that past ESMAP activities were not followed up, with limited outcomes, but that a new grant aims to pick up and carry forward the renewable energy and access themes. Together, these observations suggest that ESMAP's movement toward more programmatic activities may help support outcome achievement. At the same time, multiple completion GRMs emphasized the importance of just-in-time ESMAP support to improving the quality of policy and operational developments. The flexibility of programmatic activities can also support these emergent and evolving needs.

Strategic linkages among ESMAP thematic activities and ABG activities can help target barriers to sustainable energy development. In Vietnam, there have been strong linkages between ABG activities and thematic support. Five projects funded by ABG are supporting overall power sector planning (including market liberalization, LNG strategy and power sector planning). The thematic work on renewable energy and LNG has fed strongly into informing market simulation and power sector planning modelling by strengthening the Government's understanding of the likely penetration and cost of

renewable energy and LNG generation. In Niger, ABG was used to provide technical support for the country's National Electrification Strategy, thereby underpinning the thematic grants. Likewise, in Ethiopia, the majority of the programmatic engagement on the national electrification program has been funded by ABG, with additional support from multiple thematic windows. In Bangladesh, one ABG activity is assessing the financial sustainability of the Bangladesh Rural Electrification Board (BREB) and rural electrification cooperatives (Palli Bidyute Samities, PBS) and developing pathways and action plans to meet the government's universal access target by 2021; this activity will inform the preparation of a new investment finance project with BREB expected for delivery in FY21; these efforts are also complementing other ESMAP-funded activities related to large-scale solar development and clean cooking.[44] A second ABG activity in Bangladesh was focused on enhancing the power trade with India and less clearly linked with ESMAP thematic grants.

Similar linkages were observed between ESMAP thematic and ESR grants. For example, in Mongolia, electric thermal storage technologies for non-network heating has received support from the energy access, energy efficiency, and renewable energy windows—and informed two World Bank lending operations. But to ensure the effectiveness and sustainability of such investments, reform is needed, including to support a cost recovery tariff structure and consumption-based billing and ensure affordability. ESMAP is providing parallel support to advance such heating tariff reforms. In Zambia, the current financial position of the utility has significantly limited current prospects for renewable energy development, where ESMAP's thematic activities were focused; ESMAP's support has instead pivoted to supporting sector reform dialogue, among other foci, to address this barrier. And in Ethiopia, ESMAP-funded support related to wind development is aiming for a wind IPP, but a major barrier is that tariffs are not currently at cost recovery levels, threatening to cause further sector debt. The World Bank, with ESMAP support, is playing a key role on comprehensive tariff reform.

Linking ESMAP activities to country priorities, both World Bank's and governments', supports uptake and sustainability. In most case study countries, ESMAP-funded activities were closely linked to World Bank country management and government counterpart priorities, based on interviews and review of WBG SCDs and CPFs. In interviews, World Bank management were well-aware of ESMAP activities. In a few cases, however, activities that were less well linked to the country dialogue and interests were less effective. For example, in Bangladesh, country interviews suggested that energy efficiency has not to date been a high priority in the Bank's policy dialogue or lending at the country level. But ESMAP has been able to find other channels to support uptake, for now. The technical outputs of the ESMAP activity in the textile industry EE informed the benchmarking work under the clean production program in Bangladesh industries led by IFC. Furthermore, a JICA financed industrial EE project that is currently being implemented by Infrastructure Development Company Limited (IDCOL) also benefited from the ESMAP activity's outputs specifically in the area of waste heat recovery for EE improvement in industries. Finally, the outputs of ESMAP-funded activity on global experience and protocols for

[44] A second ABG activity in Bangladesh was focused on enhancing the power trade with India and less clearly linked with ESMAP thematic grants. Imported energy from India could include renewable sources.

measurement and verification or energy savings was developed with SREDA, which is using the knowledge to develop the Bangladesh energy manager and auditor certification program and curricula development under the provisions of its Energy Conservation Act 2014 and EE & Conservation Master Plan 2015-2030.

Government ownership and capacity are also identified in many completion GRMs as key to sustainability. In Ethiopia, for example, a key lesson learned was that "Government capacity and staffing should be at the center of any sector development plan and Bank operation." It is notable, however, that fewer activities target client capacity strengthened as an outcome; among the activity sample, the number of client capacity outcomes reported in GRMs was about two-thirds that of development finance informed or policy/strategy informed. Moreover, the reporting against this indicator was weakest, as noted in Section 4.1.2 above. GRMs also called in multiple cases for more engagement with local stakeholders, to enhance knowledge transfer and sustainability; this finding was also echoed by the MTF in terms of ensuring that the survey module was embedded in national systems.

Partnerships were given varied, and often limited, attention in the countries and activities reviewed in terms of their contributions to results achieved or sustainability. Instead, activity monitoring reports and teams interviewed mostly referred to general sector coordination (e.g., to avoid duplication rather than drive results). In the activity-level sample, about half of activities reported coordination with donors and three-quarters with development partners. The mostly commonly identified organizations associated with ESMAP donor governments included DFID, the European Union, KfW, AFD, and JICA.[45] The most commonly named development partners were IFC, AfDB, KfW, DFID, GiZ, EU, USAID, AFD, EIB, and UNDP. Although IFC was mostly commonly named as a coordination partner, among the 59 completion reports reviewed, just two identified IFC as critical for follow-up activities to ensure sustainability.

Still, the country case studies offered several examples of successful partnerships contributing to progress toward outcomes. In Ethiopia, parallel support from the Danish Embassy and Global Infrastructure Facility (GIF) has been instrumental in translating ESMAP's upstream wind mapping work into progress toward tendering an independent power producer (IPP). Danish funding has been provided for onsite wind measurements to validate the wind atlas and prepare actual sites for wind farms, with the GIF funding pre-feasibility studies at priority IPP sites, to prepare the ground for competitive tenders. The Danish are also working on the framework conditions for tenders and system integration (VRE). In Vietnam, coordinated support from the GIF and PPIAF was also highlighted to support private sector engagement. For instance, ESMAP support for a solar roadmap (including geospatial assessment of floating and rooftop potential) was followed up by support from the GIF for solar auctions. In Mongolia, the World Bank has been closely coordinating its ESMAP-funded TA support with GiZ to ensure complementary programs; for instance, in joint support for the renewable energy tariff reform, GiZ focused on the tariff setting methodology in terms of the cost elements, and ESMAP

[45] USAID was also commonly identified mistakenly as an ESMAP donor organization.

looked at the principles. In Bangladesh, coordination with the Clean Cooking Alliance (CCA) on various aspects of ESMAP-funded activity led to further collaboration with Berkley Air and Nexleaf for a holistic Indoor Air Pollution study.

In at least one country, Mongolia, ESMAP-funded activities are contributing to shifting dynamics in an over-crowded field of development partners. Multiple interviews suggested that the heating sector analytical work funded by ESMAP's Energy Efficient City Services window showed added value for World Bank involvement in district heating; the Bank is now preparing its first operation in this area—an area that has historically been the comparative advantage of other partners such as EBRD and ADB.

ESMAP has relied to a large extent on WBG lending operations as a means of ensuring that the benefits of its activities are continued after ESMAP grants close. In the activity sample, the most common follow-up action identified in the completion GRM was a WBG project. By designing project components, or providing data and analytics that underpin an operation, or advising on project implementation, ESMAP grants can leverage operations to support sustainability. This is an approach often taken, for example, in the energy efficiency program. Whether benefits continue, therefore, becomes a question of the quality of ESMAP's analytical and advisory services, as well as the overall success of the WBG operation. The country studies offered a somewhat limited view into this, as many of the operations informed by ESMAP were newly approved and just beginning operations. Some of the potential concerns have been discussed elsewhere in this report (e.g., **Error! Reference source not found.** and Box 4-3 on Kenya and Niger). There has not been systematic follow up to examine the longer-term effectiveness of ESMAP technical advice and models through WBG operations, although embedding ESMAP staff in operational teams provides a front-seat audience to the sustainability of benefits conferred by ESMAP.

Vietnam offers an interesting case for sustainability, as a middle-income country with limited opportunity for WBG lending. Some evidence shows good potential for sustainability. In the case of Vietnam, government and WBG interviews, as well as the completion GRM, confirmed that an activity funded in FY2016 through ABG strengthened capacity among the Electricity Regulatory Authority of Vietnam (ERAV) and National Load and Dispatch Centre (NLDC) to model market development. The model has become a central tool for modeling design options for power market development in Vietnam, in use for two years now to assess impacts of changes in regulation and pricing. Although encouraging, a real test will emerge in the near future when the three-year license paid for by ESMAP expires, and government institutions face the decisions of whether to continue to fund the subscription.

5. Impact

This section assesses the signals of ESMAP's impact and examines the extent to which the evidence points to ESMAP contributing to its intended direct impact of influencing development finance (including from the WBG, other multilateral and bilateral financiers, and private finance). It also considers ESMAP's contribution to the sustainable development goals and impact on the poor and vulnerable.

5.1. Development finance informed

5.1.1. World Bank Group finance

ESMAP's performance in informing World Bank development finance has been strong. Monitoring data show that three-quarters through the business period, ESMAP informed over US$26.6 billion in World Bank funding, of which approximately half (US$13.7 billion) is non-EEX GP lending operations (e.g., those in the urban, transport, water, macroeconomics, and other GPs).[46] ESMAP-informed WBG finance represents a substantial proportion of the WBG commitments to energy access, renewable energy, and energy efficiency. For example, in FY2018, the WBG committed US$1.4 billion to energy access,[47] of which two-thirds (US$930 million) was informed by ESMAP-funded activities. In FY2017-18, ESMAP informed nearly US$2.5 billion of WBG lending in renewable energy and energy efficiency.[48]

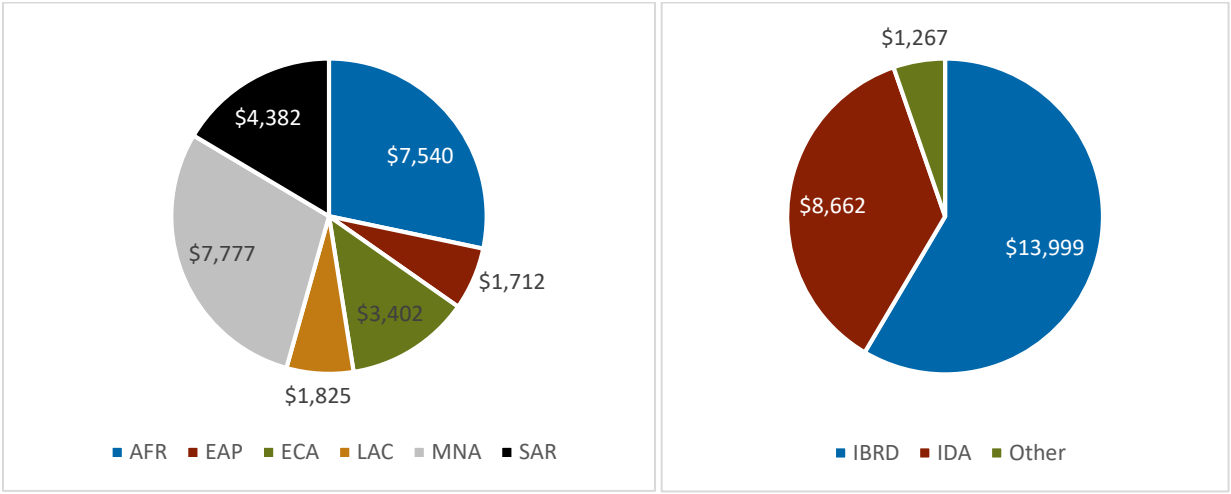
As shown in Figure 5-1, about a third of World Bank finance informed (US$7.8 billion) is in the MENA region, of which US$5.1 billion is associated with DPF series in Egypt, Iraq, and Jordan. In fact, across all the regions, DPFs represent more than a third of total World Bank finance informed in FY17-19, by lending volume. With some exceptions (e.g., Rwanda), these DPF series often cover prior actions outside of the energy sector (e.g., macro-fiscal, competitiveness, governance), and thus the full amount reported may not be influenced by ESMAP analytics. Also because of the large IBRD-financed DPFs in Egypt, Iraq, and Jordan, most World Bank finance informed is IBRD lending. Other World Bank finance informed is mostly Climate Investment Funds and Global Environment Facility funding.

[46] Data based on ICF analysis of the ESMAP FY2017-19 impact calculations, adjusted to account for differences identified in the country case studies. The country case studies allowed for a detailed look at ESMAP's contribution to lending operations in about a third of the total finance reported as informed. See also Appendix C on analysis methods.

[47] World Bank. (2019). *Energy Results*. Available at: https://www.worldbank.org/en/topic/energy/overview#3. Updated October 11, 2019.

[48] Total WBG financing for renewable energy and energy efficiency for FY2014-18 was US$11.5 billion.

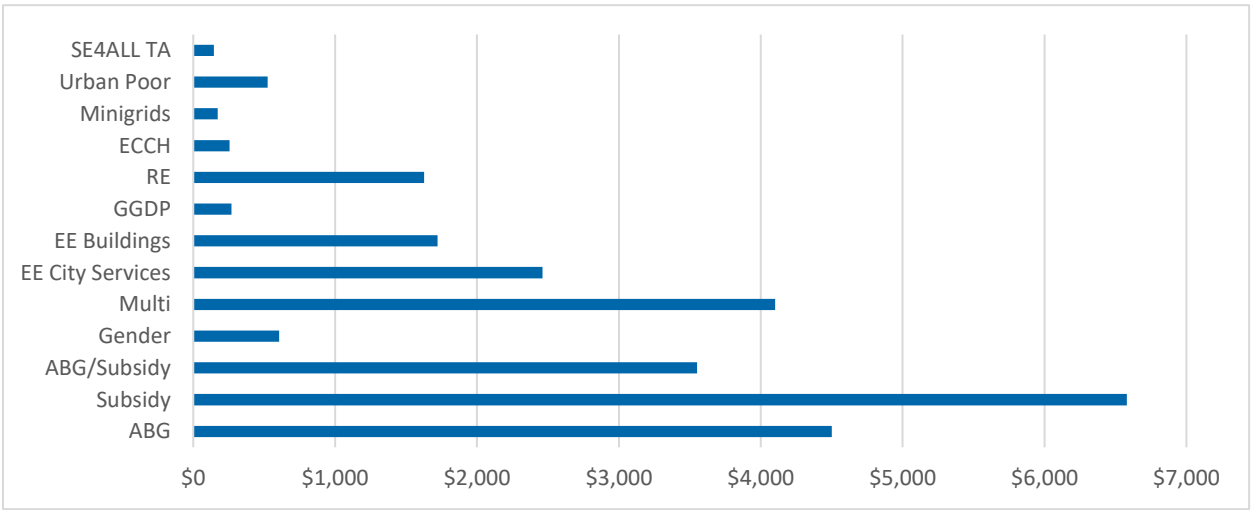
Figure 5-1. World Bank finance informed in FY17-19 by region and lending category (US$ millions)



Source: ICF analysis of ESMAP impact monitoring data for FY17-18, adjusted to account for differences identified in the country case studies

As shown in Figure 5-2, the ESR and ABG windows have accounted for the majority of World Bank development finance informed, in large part due to the high-volume lending associated with some DPF series.

Figure 5-2. World Bank development finance informed by ESMAP theme/program (US$ millions)



Source: ICF analysis of ESMAP impact monitoring data for FY17-19, adjusted to account for differences identified in the country case studies

In the countries studied, this evaluation largely validated the World Bank development finance informed that is reported by ESMAP, with a few exceptions where timing or circumstances have

changed.[49] The evaluation also identified additional World Bank lending operations that have been informed by ESMAP activities, including operations that have been informed during implementation, and new or additional finance approved in FY19 or slated to go to Board in the near future. ESMAP informed development finance in all 12 of the country studies.

The program progress reports, country case studies, and interviews illustrated some common causal pathways that ESMAP activities have taken to inform World Bank lending operations; these are not exhaustive but rather illustrative channels of influence. More clarity of reporting in GRMs and ESMAP progress reports would help improve the understanding of these pathways and how well they align with the ESMAP theory of change.

- **Renewable energy.** A holistic approach to solar development, working with grants across the mapping, VRE, and solar scale-up windows, to help projects incorporate new technologies (like battery storage, rooftop solar, and hydro-connected and floating solar), has been effective, as illustrated by the overlap in operations informed among the sub-windows of renewable energy. Renewable energy mapping alone is often not enough to catalyze a WBG lending operation, and there has often been a long lag time in some countries between ESMAP activities and potential investment in additional renewable generating capacity. Reinforcing support from other priority programs has helped move the needle.

  For example, in Niger, a pre-feasibility study jointly funded by VRE and solar scale-up has informed the Government decision to develop three solar sites and to request IFC support in this effort. Interviewees agreed that without ESMAP's technical assistance, a solar lending operation would not have been possible. In Bangladesh, complementary grants on solar mapping and solar scale-up are informing the preparation and implementation of *the Scaling Up Renewable Energy Project* approved in March 2019 and cofinanced by the Scaling Up Renewable Energy in Low-income Countries Program (SREP) of the Climate Investment Funds. ESMAP's grants are effectively generating a pipeline of rooftop solar PV and utility scale solar PV to be financed by the Renewable Energy Financing Facility (REFF) under this project and building the capacity of IDCOL to manage the REFF.

- **Energy access**. ESMAP support for geospatial electrification planning along with MTF set the stage for national electrification strategies and programs in multiple African countries, such as Ethiopia, Kenya, and Nigeria, which were then followed by World Bank operations to implement those strategies. Through Lighting Global, ESMAP informs lending operations during implementation by helping to design loan and RBF facilities, consumer awareness campaigns, and quality assurance frameworks. Lighting Global has also conducted a number of market assessments to inform the preparation of operations in the pipeline, for example, the *Regional Off-Grid Electrification Project* for West Africa and Sahel countries.

[49] For example, ESMAP influenced the second and third DPF actions in Rwanda, rather than the first; in Zambia, Scaling Solar II is reportedly not moving forward.

ECCH is informing design of pilot initiatives and clean heating technologies in WBG operations, such as in Kyrgyzstan and Mongolia, as well as hiring consultants to develop GCF clean cooking proposals in Bangladesh and Kenya, that are cofinanced with IDA credit to mobilize additional concessional finance to the sector, such as in Bangladesh. On GFMG, mini grid portfolio planning was instrumental to identify sites for mini grids in the Nigeria Electrification Project.

- **Energy efficiency.** A key pathway that the ESMAP energy efficiency windows have used to inform World Bank lending operations has been through support for the design of key project components, including financing mechanisms and business models. Examples include an urban financing facility as part of the *Shanghai Green Urban Financing and Innovation Project* and an energy efficiency credit facility for Uzbekistan's water utilities that is expected to be operationalized through the *Water Services and Institutional Support Project*, slated for approval in early 2020. Analytical work to identify energy-efficient investments in transport, water supply, and lighting have also helped to either lead to new lending operations (as in Uzbekistan) or inform operations (as in Argentina, Zanzibar, and Pakistan). The majority of Energy Efficient City Services grants during FY2017-19 have gone to non-EEX GPs (primarily Urban, Water, and Transport), and many of the operations informed by the program have also been outside the EEX GP. ESMAP also supported energy efficiency related GCF proposals for Brazil and Vietnam, now both approved.
- **ESRF.** Co-leadership of the ESRF by the Energy and MTI GPs has been a helpful factor in supporting client countries in the preparation of operations that are not led by energy, including DPFs. In FY17 and FY18, all the operations informed by the ESRF were DPFs. However, in FY19, ESRF informed investment project finance and guarantees too (e.g., in Ukraine and Tunisia). In many cases, ESMAP has funded poverty and social impact analysis and helped the Government understand and mitigate any negative impacts of tariff reforms. In Rwanda, where the DPF was focused solely on the energy sector, ESMAP provided deep analytical inputs (policy briefs, technical modeling, and presentations) to the Government for developing a new trajectory of fiscal transfers through 2024 and a policy framework for fiscal and financial sustainability of the power sector. In the absence of ESMAP support, the DPF series would have been based on financial projections from 2012-13. The Rwandan DPF series also benefited from direct support from ESMAP's GFMG, which hired two expert consultants to work with the Rwanda regulator over the span of a year to revise the mini-grids licensing framework, which is one of the prior actions in the series.
- **ABG**. Despite the high volume of lending identified as informed by ABG grants, as noted in Section 4.1.1 above, the pathways to informing World Bank lending operations through ABG are more difficult to characterize. Several operations have been large DPF series, with ESMAP TA co-funded by ABG and ESRF. In Africa, some of the operations identified as informed by ABG are focused on electricity access, including in capital cities in Cote d'Ivoire, in Ethiopia, and in Niger. In other regions, ABG has also been linked to energy efficiency, hydropower, and power transmission and efficiency projects.

5.1.2. Mobilizing non-World Bank finance, including private finance

In the first three years of the business period, ESMAP activities informed lending operations associated with US$15.8 billion in non-World Bank finance. Approximately half of this amount is expected public co-finance and half is expected private finance, as reported at the time of Board approach. Public co-finance is primarily by government borrowers, as well as other development partners, such as ADB, AfDB, EIB, GCF, and bilateral partners. Private finance is largely associated with private capital and commercial lending (e.g., to sub-borrowers).

For private finance, the larger amounts are generally linked to renewable energy investments (e.g., geothermal development, utility-scale solar), and energy efficiency. Of the US$8.1 billion in private finance associated with lending operations informed by ESMAP activities, more than half is associated with four World Bank operations. Nearly US$1.5 billion is reported for a renewable energy project in India, *Shared Infrastructure for Solar Parks*, as private investment mobilized for solar parks. And another US$1.5 billion is recorded for the *Ukraine Gas Supply Security Facility* as commercial lending; this project was informed by an ABG grant focused on electricity and gas market reforms. The *Financial Instruments for Brazil Energy Efficient Cities* project accounts for another US$728 million in commercial financing and sub-borrowers, and the *Turkey Geothermal Development Project* for another US$619 million in private capital. National projects supported by the SRMI are also expected to mobilize US$1.3 billion of private investment in the shorter-term and US$6 billion in the longer-term, which would double the current amount accounted for by ESMAP.

As noted above, the evaluation has reported expected non-WBG finance associated with lending operations that ESMAP activities have informed. However, verifying the contribution of ESMAP activities to specifically mobilizing private finance within nearly 150 WBG lending operations was beyond what was possible in the scope and resources of this evaluation.[50] Review of ESMAP program progress reports gave some indications of major areas where ESMAP support has contributed to maximizing finance for development. The country studies also provided a more detailed look at the influence of ESMAP activities on public and private co-finance. Activities under the energy efficiency program, for example, have often helped to design the financial mechanisms that will mobilize private investment through WBG operations. Lighting Global activities have regularly involved design of credit facilities that will leverage private finance, such as in Rwanda and Niger. Renewable energy mapping has helped set the groundwork for private finance, as in Bangladesh, where US$120 million in commercial lending is expected to be mobilized through the renewable energy financing facility for which ESMAP has helped set up a project pipeline (see also Section 5.1.1 above). The mini-grids program is piloting a PPP model through an electrification lending operation in Nigeria (as well as Myanmar and Haiti), which shows

[50] Descriptions of the contribution of the ESMAP activity to the lending operation, as provided in ESMAP program progress reports and activity-level GRMs, were not always specific enough to enable assessment of contribution to mobilizing private finance, with some exceptions. Thus, the evaluation reports expected non-WBG finance associated with lending operations that ESMAP activities have informed.

promise to leverage significant private finance (US$410 million expected in commercial finance in Nigeria). This evidence from country case studies provides support to the overall private finance amount reported.

The country case studies also provided examples where ESMAP support has mobilized parallel or other finance not included in ESMAP's operation-linked reporting, or has contributed to outcomes that could be considered to remove barriers to private investment in sustainable energy. In Ethiopia, for example, ESMAP support was instrumental for the development of the National Electrification Program (NEP) 2.0, which integrates off-grid access in the electrification plan. The NEP has served as an investment prospectus for the Government to mobilize other donors. According to interviews, AfDB has committed US$15 million for a mini-grid project that is parallel to World Bank's project approach, as well as another US$100 million from AfDB for off-grid solar, along with US$35 million in cofinance from the EU. Conversations are reportedly ongoing with other development partners as well for additional finance. Similarly, in Kenya, ESMAP data and analytics directly informed the National Electrification Strategy and gave confidence to donors to invest in the Government's Last Mile Connectivity Programme, including US$30 million from AfDB and US$180 million from EIB, AFD, and the EU. As another example, in Nigeria, the ESMAP-designed mini-grids component of the IDA project attracted US$200 million of AfDB funding, and according to the government, there is interest from private investors and domestic commercial banks to further invest in mini grids.

ESMAP has also in several cases provided funds to support the development of a project proposal to the Green Climate Fund (GCF), leveraging both public and private funds. In Vietnam, ESMAP provided resources to develop a GCF proposal to finance a risk sharing facility for energy efficiency. The proposal was approved for a GCF-funded risk sharing facility of US$75 million alongside US$11.3 million of GCF grant funds and US$101.7 million in World Bank co-finance. The proposal envisages supporting an additional US$307 million of investment from a range of Private Finance Institutions (PFIs) as well as energy service companies (ESCOs). GCF project proposal development has also been financed by ESMAP in Bangladesh, Brazil, and Kenya. The burden of GCF project preparation is perceived as significant enough by WBG staff that these projects may not have moved ahead without ESMAP support.

The country case studies also offered examples of ESMAP contributions to improving the investment climate by removing barriers to eventual private investment in sustainable energy—although these outcomes are not often described this way in GRMs. For example, in Mongolia, ESMAP helped remove the barrier of a too-high feed-in-tariff (FIT) for renewable energy—introducing upper tariff limits and competitive auctioning through an amendment to the renewable energy law—and putting the Government on a better path to scale up renewable energy through power purchase agreements (PPAs). In Ethiopia, as mentioned earlier in this report, ESMAP-funded wind mapping combined with parallel support from the Danish Embassy and GIF are setting the stage for a potential future wind IPP. But these changes will take time, and possibly additional support, to translate into private investment. And in Vietnam, the government is moving towards a market-based planning mechanism, allowing for more flexible addition of new technologies and more flexible grid management. Wholesale markets are now in operation with all generation companies expected to participate by 2021 and the withdrawal of

long-term contracts. With ESMAP support, the Government has shifted from FITs toward solar auctions, which is expected to reduce costs significantly.

5.2. Impact on sustainable development

ESMAP's contributions are mostly closely linked to SDG7: Affordable and Clean Energy. The World Bank lending operations informed by ESMAP activities in FY2017-19 are expected to provide more than **76 million people with access to electricity, install 17.6 gigawatts of renewable energy, and result in 605 terawatt hours of projected lifetime energy and fuel savings**. These results are associated with operations in 54 countries. Worldwide, **the 76 million people expected to gain access to electricity represent about nine percent of the unelectrified global population as of 2017**.[51,52]

The degree of impact relative to SDG7 targets and ESMAP's contribution differs by country and region. In Sub-Saharan Africa, for example, operations informed by ESMAP in FY2017-19 are expected to provide nearly 28 million people with access to electricity; this represents five percent of the unelectrified population in Africa as of 2017.[53] These include substantial increases (close to 1 million or more people) in several top 20 deficit countries in Africa (Burkina Faso, DRC, Ethiopia, Kenya, Madagascar, Mozambique, Niger). Several operations in South Asia also involve substantial advances in electricity access in high-deficit countries (Bangladesh, Pakistan). The country case studies offered examples:

- In Ethiopia, ESMAP support has helped set the implementation pathway for Ethiopia to achieve universal electrification by 2025, through NEP 2.0 and led to operations that start to close the gap. Over 10 million households will need to be connected to meet Ethiopia's goal. The World Bank-funded Ethiopia Electrification Program aims to provide 5,400,000 people with ongrid access (490,795 achieved so far); and 255,000 people with offgrid access, with 51,100 HH provided with electricity through mini-grids and SAS).
- In Rwanda, ESMAP provided deep analytical inputs to the energy reform DPF series, which holds the government to an overall 20 percent increase in electrification over a three-year period. Among rural households, the prior action is expected to result in expanded electrification from 16 to 25 percent over the same period. Electrification among female-headed households is expected to double from 21 to 42 percent. The DPF series also contributes to all three NDC priority mitigation actions in the power sector and promotes a renewable energy transition in both on-grid and off-grid space, with a larger role for hydro, solar, and lake methane.

[51] IEA, IRENA, UNSD, WB, WHO. (2019). *Tracking SDG 7: The Energy Progress Report 2019*, Washington DC.

[52] For renewable energy, further assumptions and conversions would be required to compare the installed capacity targeted with the renewable energy consumption data reported for tracking SDG7. Similarly for energy efficiency to compare to energy intensity tracking under SDG7.

[53] IEA, IRENA, UNSD, WB, WHO. (2019). *Tracking SDG 7: The Energy Progress Report 2019*, Washington DC.

- In Vietnam, ESMAP has provided comprehensive support across multiple aspects of sustainable energy development, and positive progress is noted in key areas of support. While non-hydro renewable energy currently accounts for only 2 percent of the energy mix, the Government is rapidly scaling the introduction of renewable energy capacity in its Eighth Power Development Plan. Current targets aim to increase the share of renewable energy to around seven percent by 2020 and above 10 percent by 2030. In energy efficiency, the Government is promoting more aggressive energy efficiency targets, with the draft 2019-2030 programme on energy savings aiming to reduce 8 to 10 percent of the total nationwide energy consumption, equivalent to 50 to 60 million tons of oil equivalent. Over the period under review, the Government has also eliminated most subsidies on fossil fuels and is moving towards more cost reflective tariff structures.
- In Niger, the utility, NIGELEC, has 165,300 consumers in the region of Niamey, Tillabery, and Dosso, with a peak demand of 115 MW and maximum available generation of 126 MW. Rural electrification stands at around 1 percent. ESMAP support in the form of pre-feasibility studies and the design of the financing mechanism has been instrumental in leading to a World Bank operation to add 9.5 MW of solar energy capacity and provide nearly 400,000 people with electricity access. ESMAP support also confirmed the suitability of three sites for utility scale ground-mounted solar plants, which has led to interest from solar developers and a request from the Government to IFC's Advisory Services to support the development of up to 60 megawatts peak (MWp) solar capacity at Gorou on an international competitive bidding basis. Scoping work has begun for a potential Scaling Solar program in Niger.

ESMAP's support can also be linked to SDG12 on rationalizing inefficient fuel subsidies, such as in Egypt, Ukraine, and Tunisia, and **SDG13 on climate action**, particularly with respect to implementing NDCs, as was referenced in Rwanda and Vietnam in terms of power sector decarbonization. In Rwanda, the DPF series that was informed by ESMAP analytics contributes to all three NDC priority mitigation actions in the power sector and promotes a renewable energy transition in both on-grid and off-grid space. World Bank operations informed by ESMAP's gender and energy regional programs can be linked to SDG5 on gender equality, particularly on ending discrimination against women in the energy labor force (see Section 4.2).

ESMAP's impact on the poor and vulnerable is less easy to systematically understand. The current approach to reporting, in both ESMAP and the broader WBG, is a major contributing factor. Less than 10 percent of GRMs in the activity sample describe ESMAP support focused on poor or vulnerable people, and nearly all these activities were ESR grants describing poverty and social impact analysis. ESMAP program progress reports do not focus on these impacts, either. In addition, many of the WBG lending operations to which ESMAP activities are linked do not include results indicators with a poverty focus (e.g., number of beneficiaries or households with electricity access that are below the poverty line)—further limiting ESMAP's ability to report the related impact to which it has contributed.

Several ECCH activities in the country studies focused on vulnerable populations, as shown through the country studies. In Bangladesh, an ESMAP-funded clean cooking grant informed a World Bank operation that the clean cooking component of which is expected to have 100 percent female end beneficiaries. By

supporting local supply chains and working closely with local village influencers and early adopters, the program has boosted adoption rates for the improved cook stoves and created more than 3,000 direct and indirect jobs for women. Women involved in the program are earning an income and reducing poverty levels for their families. In Mongolia, ESMAP support has focused on efficient heating solutions for people living in the informal ger districts of Ulaanbaatar, where vulnerable households still use traditional stoves for heating. According to Government interviews, the electric heating technology supported by the ESMAP TA will go with priority to the poorest families. As illustrated in Niger in particular, affordability is a critical hurdle and one that requires concentrated attention to ensure that the poorest and most vulnerable benefit from access operations.

6. Governance and Management (Efficiency)

This chapter addresses governance and management issues. It answers key questions related to the efficiency and cost-effectiveness of ESMAP programs, and the efficiency and effectiveness of ESMAP's governance structure, including the role of TAG and the CG. It also reviews operational processes that affect progress toward results and assesses the extent to which ESMAP has acted on recommendations from the previous evaluation. Finally, this section considers the extent to which the Results Framework is relevant, coherent, and consistent.

6.1. Governance

ESMAP is governed by a CG, comprised primarily of contributor organizations (donor governments and philanthropic organizations) and the World Bank. The CG is advised by a Technical Advisory Group (TAG).

6.1.1. Consultative Group

The CG is an effective governing body for ESMAP. This finding is based on interviews with CG members and ESMAP staff, as well as desk analysis of CG meeting minutes. These evidence sources show that CG is fulfilling key normative functions. These include providing strategic direction for the use of program resources and exercising appropriate management oversight, including endorsement of multi-year business plans and terms of reference for external evaluation and the TAG, and reviewing results achieved against the business plan targets.

The use of a CG is an adequate model for governance of a trust-funded program, and the flexibility of the governance model is appreciated by CG members and the ESMAP Secretariat. Across the board, CG members felt that they were adequately consulted by ESMAP management on the direction of the program and that the CG's views were heard and considered by ESMAP management.

The CG governance structure is also used by other comparator MDTFs in the World Bank, such as the Global Facility for Disaster Reduction and Recovery (GFDRR) and the Global Water Security and

Sanitation Partnership (GWSP).[54] A CG is a more flexible and feasible approach for an MDTF the size of ESMAP, compared to a governing body that takes activity-level approval decisions. The latter approach is used by some smaller trust funds, as well as some larger trust funds like the GEF and CIF that have a governing council or committee consisting of donor and recipient countries that are involved in program- or project-level decision making. A governing body approach for smaller trust funds the size of ESMAP, however, was seen by some interviewees as negatively impacting the efficiency of those programs.

The CG relies primarily on strong governance norms, since there is no program charter that specifically describes membership rules or roles and responsibilities for the CG. This approach contrasts with that of GFDRR and GWSP, which have partnership charters that describe the membership rules and functions (see Box 6-1). ESMAP's CG includes all current and past donors as members, with potential donors and other invited entities included as observers. Interviews with CG members indicates that continuity among some CG members have served for longer helps support these governance norms.

BOX 6-1: GOVERNING BODY MEMBERSHIP RULES AND FUNCTIONS IN COMPARATOR MDTFS

	Functions	Membership rules
GWSP	Council responsibilities include strategic guidance on the direction of the MDTF, assessment on the progress of work program implementation and the results achieved as well as financial and administrative matters	World Bank Water GP and donor agencies that commit at least **US$2 million per year** to the GWSP or other Water GP trust funds, of which at least US$1 million is to the GWSP core MDTF
GFDRR	CG responsibilities include strategic direction to the program, approving work plans and annual reports, commissioning studies and reports, including evaluations, and approving terms of references for advisory groups	CG is comprised of Members and Observers. Members are WBG, UNODRR, donor agencies that commit to **US$3 million over three years** to the GFDRR MDTF, developing countries that commit US$500,000 over three years, and countries or entities that receive an invitation. Observers include entities whose contribution is below the threshold.

Sources: GFDRR Partnership Charter; Charter of the GWSP Council (2017)

While ESMAP's more informal approach is still working, interviews suggest some emerging tensions as ESMAP has grown over the past several years and new channels of contributions have opened and expanded. In interviews, CG members were not clear about the unofficial rules for membership. Newer

[54] GFDRR and GWSP were selected as comparator trust funds after a review of the World Bank Group's 2018-19 Trust Fund Annual Report, describing the financial trends and achievements of IBRD/IDA and IFC trust funds. The evaluation team filtered for MDTFs (rather than single-donor) operating on a global scale (rather than in individual country or region), with a relatively similar approach of providing technical assistance grants to countries and regions and undertaking global and regional knowledge initiatives, with a aim of informing World Bank lending operations. Among the trust funds that met those criteria, GFDRR and GWSP were the closest in size to ESMAP in terms of annual disbursements. Still, there are differences among ESMAP, GFDRR, and GWSP that limit direct comparisons.

representatives of CG members also shared the struggle to understand the role of the CG vis-à-vis ESMAP management, in the absence of a charter or other guidance.

CG interviewees also expressed concerns that in the future, depending on how ESMAP grows, some donors could provide limited funds for specific purposes and still influence the use of ESMAP funds, by exercising their voice as a member at CG meetings. In theory, smaller donors' resources could be reallocated to meet the overall needs of the business plan—a flexibility that ESMAP management has retained—although according to interviews, this has not happened in practice. Relatedly, several CG members raised the potential for a future "free rider" risk, if peer pressure is lacking to increase contributions, given that organizations can still participate as members if they are not a current donor or contribute smaller amounts. **To date, a pragmatic solution to ensuring that donors voices are heard has been donor-and-management-only closed sessions at every CG meeting.**

6.1.2. TAG

Purpose and role of TAG in the current business period

Prior to 2019, according to its terms of reference (TOR), the purpose of the TAG was to provide an informed, independent assessment and related recommendations to the CG about the strategic direction and priorities of ESMAP and ASTAE and to assess the programs' impacts and effectiveness in meeting their missions. The TAG comprised three members that are sector specialists, who meet at a minimum twice per year, including once for the CG annual meeting and mid-year discussions with ESMAP management and staff of the World Bank. Prior to each meeting, the TAG consults with ESMAP management in setting its agenda.

Under this mandate, the TAG delivered two annual reports, for FY17 and FY18, that reviewed the strategic direction of ESMAP. In 2017 the TAG provided a review of ESMAP's entire portfolio. In addition, TAG reviewed the financial data provided by ESMAP management. In 2018, based on feedback from the CG in 2017, TAG focused instead on several current and emerging issues within the energy sector and offered a few recommendations.

The CG agreed at its April 2018 meeting that there was a need to revisit the TAG's TOR. **While CG members felt that a broad overview of the program by the TAG was useful (particularly for new CG members), several CG members expressed concern that the TAG report lacked the depth and detail necessary to inform discussion**. Specifically, CG Members felt that the TAG should focus in more detail on ESMAP's targets, indicators and results chain, while also advising ESMAP on frontier areas and giving guidance regarding topic prioritization.

In 2019, the TOR of the TAG were revised on the basis of feedback and input from the CG and informed by a review of the experience with similar advisory panels in other World Bank trust fund programs. Two

roles were set for the TAG.[55] The first role was to conduct an assessment and prepare a "scorecard" to the CG on the achievement of ESMAP's business plan targets, indicators and results chain, identifying areas of implementation strength and weakness, as well as recommending any adjustments to the business plan. The TOR suggested that this report could include a "traffic light" monitoring system. The second role was to prepare and/or participate in one or more working groups to prepare ad hoc analysis on priority technical or strategic topics, as defined jointly by the CG and ESMAP management.

In response, the TAG, working with the ESMAP team, developed a new "traffic light" portfolio review system. TAG was tasked to use available existing data and reporting, as presented in activity reports (Grant Report and Monitoring Reports, or GRMs) and program progress reports, to help assess the overall health of the portfolio using a combination of both quantitative indicators and qualitative indicators.[56]

Looking forward

There is broad consensus among CG members, ESMAP management, and even the TAG that the current model is not meeting the needs of the ESMAP community. The feedback on the newly developed traffic light system echoes this general feeling. In this context, the ESMAP Secretariat attempted a different approach to the TAG to fulfill its need for external, strategic input in the next ESMAP business plan. The Secretariat organized a TAG workshop in September 2019 that included a larger number of experts, covering a greater number of disciplines. Over the course of two days, these experts provided re-thinking on how ESMAP's work is organized, and identified areas for deeper focus, without losing momentum under existing legacy programs that are doing well. Several interviewees believed that the workshop offered useful input and represents a good format for informing the business plan at a strategic level.

Even though the current model is not working optimally, **CG members maintain that a TAG has an important place in the ESMAP governance model.** Principally CG members are seeking the TAG to play an independent quality assurance function, as well as serve as a strategic advisor, to review the direction and priorities of ESMAP and flag and identify issues. Interviewees acknowledged that different skillsets may be required for quality assurance versus strategic advice—as the TAG experience with the traffic light system illustrated—and thus the current approach for staffing TAG is not meeting needs. These functions could be served with different configurations of TAG members, with different meeting frequencies, and flexible TOR to meet the evolving needs of the CG. A frequent suggestion in interviews was to have the TAG do deeper assessments of ESMAP's relevance and results in specific thematic or

[55] For these TOR, additional membership criteria are that (1) At least one member of the TAG should have strong familiarity with the World Bank's energy sector operations and country programs; and (2) At least one member of the TAG should have a demonstrated track record in program monitoring and evaluations in the energy sector.

[56] Five indicators were initially proposed by ESMAP, with TAG utilizing four of them for the purpose of portfolio review.

cross-cutting areas, depending on the interests of the CG, and that the TAG could be staffed accordingly to meet these needs.

6.2. Program efficiency

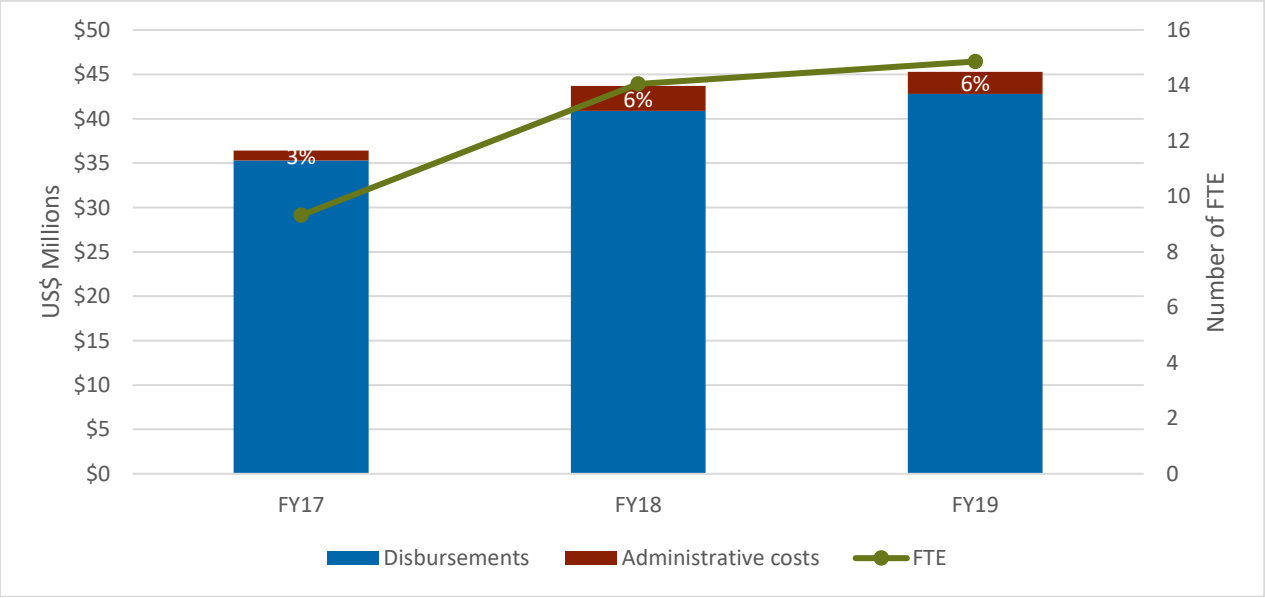
6.2.1. Program management and administration efficiency

ESMAP has maintained the cost-effectiveness of its program while experiencing significant growth since the last business period. Program management and administrative (PMA) costs[57] have averaged 5 percent over the business period so far, while disbursements have grown from about US$25 million in FY2015 to nearly US$45 million in FY2019 (see Figure 6-1). This level of costs is lower than during the previous evaluation period (9 percent).

Box 6-2. PMA activities include:

- Program management within the WBG, development partners, clients and stakeholders
- Ensure and maintain governance arrangements, including negotiating replenishment / expansion
- Business planning & strategy, including managing program budgets and expenditures
- Manage proposal process, including allocation of programmatic funds
- Program M&E, including quality assurance & enhancement and managing technical advisory panel/group
- Knowledge management and dissemination
- Manage communications and outreach, including websites, publications, social media and Communication & Visibility Plan (CVP)
- Develop and implement program-specific management tools and systems

Figure 6-1: Program management and administrative costs, disbursements, and full-time equivalents (FTEs), FY17-19



Source: Data provided by the World Bank's Development Finance Unit

[57] For the purposes of this evaluation, PMA costs are inclusive of program management, CG and TAG, portfolio management / monitoring and evaluation, knowledge management, and communications and outreach costs.

ESMAP benchmarks favorably to comparator MDTFs. ESMAP's level of cost is on par with GWSP and slightly less than GFDRR, whose PMA costs as a percentage of total program costs have averaged 7 percent over FY17-19. ESMAP's PMA cost level is also lower than that of PPIAF, an MDTF disbursing half the funds of ESMAP on an annual basis. In terms of dollars disbursed per full-time equivalent (FTE), ESMAP is on par with GFDRR and nearly twice as efficient as GWSP, although GWSP is in its first few years of operation, when administrative costs are typically higher, and uses a different trust fund (TF) staffing model. ESMAP has also disbursed its resources between country and global/regional (own-managed) activities similarly to its two comparators, GFDRR and GWSP.[58]

Efficiency gains have been realized by ESMAP through several means. ESMAP is acting as an umbrella trust fund for the Energy and Extractives GP, managing both contributions to the main trust fund and co-finance contributions for specific World Bank lending operations (see also discussion below). Contributions for the latter have increased during this business period, compared to the last, while PMA costs have remained relatively flat. The cross-support that ESMAP staff provide to operational teams keep administrative staff costs down (in terms of FTE), while widening the influence of ESMAP.

ESMAP has also sought ways to streamline its operational processes and moved to an automated online system for grant management during the business plan period. In addition, in interviews, ESMAP staff pointed to efficiency measures such as promoting wholesale approaches (e.g., sharing approaches and terms of references for solar development) and the use of framework contracts to reduce procurement burdens and timelines for task teams (e.g., by retaining a roster of shortlisted expert consultants and firms for certain services). Efficiencies in the use of grant resources are also achieved by identifying trends in terms of operational teams' requests for similar work that can be standardized and developing global tools to address those recurring needs at lower costs. Examples include the Global Solar and Wind Atlases, geospatial planning tool, and forthcoming global electrification platform.

At the same time, ESMAP staff remain overstretched, as was also noted in the previous independent evaluation. New programs and initiatives (such as offshore wind, clean cooling, and powering past coal) have been launched without increases in staffing, keeping administrative costs low but straining staff. Increased preferencing of donor contributions (see discussion below) increases the burden on ESMAP staff for tracking, managing, and reporting against these preferences. Administrative costs went up in absolute terms in FY2018 as a result, although disbursements also increased. A measure of realism is required in terms of the extent to which ESMAP can continue to grow its disbursements, program, and initiatives without associated increases in staffing.

ESMAP also leverages Bank budget to achieve efficiencies, although the data are inconclusive on this point. Grants provided to the regional operational units are required to have cost-sharing arrangements,

[58] In FY19, GFDRR and GWSP disbursed 37 and 36 percent for country activities and 63 and 64 percent for global and regional activities, respectively. ESMAP is reported as disbursing 48 percent for country activities and 52 percent for global and regional activities, but "country" activities for ESMAP is inclusive of regional grants and thus is likely closer to GFDRR and GWSP proportions when this is accounted for.

with approximately 10 percent of the total grant value expected to be contributed from the Bank budget. The Bank budget is seen as a signal of country office support to the ESMAP-funded activity.

However, actual Bank budget allocations and expenditures are tracked at the "P-code level," a level at which ESMAP may be the sole funder or may be one of multiple funders. This makes it difficult for the evaluation to verify whether the promised Bank budget is indeed spent in support of activities aligned with the ESMAP child trust fund. The available data show that among the evaluation's activity sample, **nearly a quarter of ESMAP activities are linked to P-codes that have no associated Bank budget, and another 13 percent have associated Bank budget that is less than 10 percent of the total ESMAP grant value**.[59] The interpretation of these data is challenged by the fact that in some cases a task team may be supervising the ESMAP child trust fund and an associated lending operation or advisory service and analytics (ASA) activity that is under a different P-code, which may be the source of the Bank budget leveraged. Thus, **it is likely that the actual proportion of ESMAP activities that do not leverage Bank budget is smaller than the data suggest**.

6.2.2. Operational considerations

This section considers several trends and issues that have been raised related to ESMAP's operating model, including ESMAP's role as the umbrella trust fund for the EEX GP (and the implications of the World Bank's trust fund reform initiatives), the influence of soft earmarking on ESMAP operations, and the World Bank corporate initiative to reduce the number of ASAs.

ESMAP as the umbrella trust fund for the Energy and Extractives GP

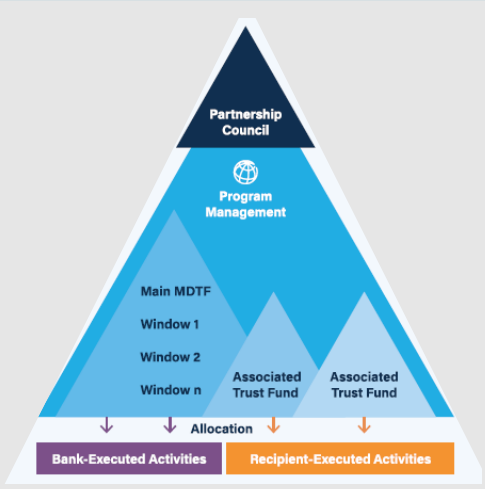
Through FY2017, WBG trust fund reforms focused on improving the strategic oversight and management of the entire trust fund life cycle, including integrating trust fund and operational systems and processes. The current phase of reforms seeks to align WBG trust funds with the WBG's *Forward Look* and twin goals, through continued movement toward fewer, larger umbrella funds that could include multiple "associated" trust funds, and better integrating trust funds into WBG strategy, planning, and budgeting. Umbrella "2.0" programs will "provide scale and efficiency while maintaining

[59] For the purposes of this analysis, estimated at the total ESMAP grant plus the Bank budget associated with the P-code.

the possibility for donors to preference their contribution and offering detailed reporting and visibility."[60]

ESMAP in many ways already encompasses the WBG's vision for an umbrella fund that serves as flexible instrument for aligning and managing development resources (Box 6-3). ESMAP includes a main MDTF with multiple thematic windows, as well as expanding operational modalities. Both Bank-executed and Recipient-executed grants are implemented. ESMAP can be used to channel funds from donors for specific purposes, such as from the Danish Embassy for parallel support on wind development in Ethiopia, without establishing a new trust fund. ESMAP can also be used to channel funds from donors through associated trust funds for specific Recipient-executed activities, as has been done to process bilateral co-finance for the Regional Off-Grid Electrification Project (ROGEP).

BOX 6-3: WBG UMBRELLA "2.0" TRUST FUND



Source: World Bank Group. (2019) *2018-2019 Trust Fund Annual Report: Value Proposition of World Bank Group Trust Funds.*

ESMAP now serves as the secretariat for the Tracking SDG7 effort, transferring grant resources to other custodian agencies, such as IRENA and IEA, and a new ESMAP clean cooking fund offers the possibility of transferring resources to UN agencies as grant recipients. A framework agreement in the Bank for that modality enables ESMAP to have this flexibility without developing its own administrative arrangements. Across these modalities, the ESMAP Secretariat has unified operational guidelines and manages the central monitoring, reporting, and evaluation function, with the exceptions of the custodian agencies and preferenced recipient-executed trust funds. On the new clean cooking fund, however, several CG members raised concerns about the potential for additional transaction or administrative costs in terms of taking on this new financial instrument.

ESMAP has a somewhat unique role in the World Bank as such an umbrella fund, so far. The Water GP is the only other GP that the evaluation team is aware of with a somewhat comparable umbrella MDTF: the GWSP, which was launched in 2017 and built on two previous MDTFs in the Water GP that were discontinued. Similar to ESMAP, the GWSP aims to "support client governments to achieve water related SDGs, through the generation of innovative global knowledge and the provision of country-level support, while leveraging World Bank Group financial instruments and promoting global dialogue and advocacy with key partners and clients to increase reach and impact."[61] GWSP is a young fund, with first

[60] World Bank Group. (2019) *2018-2019 Trust Fund Annual Report: Value Proposition of World Bank Group Trust Funds.*
[61] World Bank Group. (2017). *Global Water Security & Sanitation Partnership (GWSP)*. Retrieved from World Bank : https://www.worldbank.org/en/programs/global-water-security-sanitation-partnership

disbursements only in FY18, but it could offer a counterpart for exchange of experiences and lessons learned with ESMAP. Interviewees suggest that GWSP is looking to ESMAP as a potential model to replicate, as GWSP is currently following a different staffing approach.

ESMAP's operating model is still working, due in part to effective and pragmatic program management. But the evaluation has identified some potential challenges that require attention. These relate to governance concerns associated with a changing landscape and dynamic in CG membership, as new channels and complexions of donors contributions emerge, as discussed Section 6.1.1 above. These challenges also relate to the management of increased preferencing, as discussed below, and the additional burden of monitoring and reporting against a range of donor needs while the WBG is also moving toward more programmatic ASAs, also discussed below.

ESMAP and preferenced funding

The ability to indicate non-binding preferencing for their contributions plays an important role in helping donors fundraise internally and remains part of the WBG's vision for umbrella trust funds. But it also creates a resource management challenge for the Secretariat. Balancing resource commitments from donors with demand from World Bank regional and country teams is an ongoing administrative exercise. As the number of donors and amount and specificity of preferenced funding increases, so does the challenge of the balancing act.

For the FY17-20 business period, ESMAP management and the CG agreed that ESMAP management would have flexibility to take some funding off the top of preferenced contributions in order to ensure adequate budget for the business plan as a whole, including program management and administrative costs and ABG. Donors were encouraged to provide preferences at the program level (e.g., RE, EA, EE, ESR) and for regions rather than countries. **In practice, however, with the exception of ESR preferencing, donor preferencing has been mostly at the sub-program (priority) level and across programs (e.g., Powering Past Coal).**[62] This has meant that the ESMAP Secretariat must manage not only the program windows, but also preferenced funding within the programs (e.g., for Clean Cooling within Energy and Sustainable Buildings or the Hydropower Development Facility).

For the FY17-20 period, ESMAP management also agreed to provide more clarity on preferenced funds received. In its biannual budget notes to the CG, **the Secretariat has begun reporting on preferenced contributions received, which supports transparency.** However, reporting is not entirely apparent in terms of how non-preferenced funding is utilized, in the view of some CG members. For example, questions were raised about whether non-preferenced funding might be used to fund new programs for which some, but not all donors expressed interest. Interviews clarified that new initiatives such as the

[62] Few donors have specifically named preferenced countries, excepting contributions for RETF co-finance.

offshore wind facility, hydropower development facility, and clean cooling are currently being funded solely by donors who have given preferenced funding for those purposes.

In the FY17-20 period, nine of the 20 ESMAP donors did not contribute non-preferenced funding.[63] Of total donor contributions of US$238 million, about half has been non-preferenced (approximately US$122 million); the large majority of these contributions have come from four donors (Netherlands, Sweden, UK DFID, and Denmark).[64] While all ESMAP donors value ESMAP's flexibility, **non-preferenced funding is important to allow ESMAP to implement its business plan and have some margin of flexibility in terms of responding to demand**. Non-preferenced contributions are also particularly important for ABG allocations to regional operational units and for the regional gender programs. ABG was budgeted at US$40 million for the FY17-20 period and under-funded at US$34 million, prior to the launch of the Hydropower Development Facility (which is included in the ABG amount in the ESMAP Budget Note for March 2019).

Certain thematic windows have received more preferenced funding than others. As in the last business period, the ESR facility has been entirely funded by preferenced contributions at a level that exceed the FY17-20 Business Plan baseline budget. The ESRF projections in the ESMAP Budget Note as of March 2019 suggest that more than US$2 million will be unallocated at the end of the business plan. In contrast, the RE window (covering RE mapping, VRE, solar, and battery storage) and ECCH window have received negligible preferenced funding. They have also been most substantially underfunded relative to the baseline budget, and the RE window has been over-subscribed. This suggests a margin of misalignment between donors' preferenced contributions and country clients' interests or needs.

Overall, interviewees from the CG and the EEX GP see ESMAP as managing well the increase in preferenced funding. The implications are that it takes proactive, flexible, and pragmatic management and a continued willingness of some donors to carry the majority burden-share of non-preferenced funding. There are also some operational process implications, as discussed below.

ESMAP and the corporate push to reduce the number of ASAs

ESMAP is subject to the World Bank corporate initiative to reduce the number of "P codes" and child trust funds, and larger, programmatic activities are one way to achieve this. Several country teams are planning ESMAP programmatic grants and ASA projects that put multiple activities under an umbrella to be flexibly managed. More programmatic activities have also come through lately as a result of the Powering Past Coal agenda, which works across thematic programs.

Programmatic activities offer some advantages for linking with WBG programming and adaptive management, which can drive results. Programmatic activities may be able to link more closely with the

[63] Australia, Austria, ClimateWorks, EU, Finland, Germany BMUB, Iceland, Luxembourg, and the Rockefeller Foundation, based on the FY19 Budget Note.

[64] Analysis based on FY19 Budget Note.

CPFs, with activities programmed in parallel with the Bank's programming cycle. This would also be in line with the objectives of the current phase of WBG trust fund reform. The flexibility can also help task teams evolve outputs in response client needs and context.

Programmatic activities are also likely, however, to bring some challenges for ESMAP, especially related to reporting. These activities are likely to be increasingly funded by multiple ESMAP windows. There are several options in terms of how programmatic activities could be structured and reported on (e.g., with multiple grants attached to a programmatic ASA and reported on separately, or one programmatic grant reporting outcomes across the windows). At the same time, the specificity of donor preferencing requires reporting that connects window funding with the results achieved. Being explicit about whether a regulatory amendment or lending operation is primarily associated with the ABG or VRE or ECCH deliverable will likely be tricky. The country studies illustrated that in multi-window grants, the connections between those windows and outcomes was not always clear, even when interviews were conducted to further elucidate. While evidence of "contribution" is often accepted M&E circles, if everything contributes to everything, there could be a loss of potency in terms of the understanding of ESMAP's theory of change for its programs.

Another risk is that programmatic activities provide teams with "slush funds" or finance activities that are less impactful but also less visible given the size and complexity of the grant.

Effectiveness and efficiency of operational processes

ESMAP is seen by EEX GP regional and task teams as agile, flexible, and quick compared to other trust funds. In the words of one the regional team staff, ESMAP is "a gold standard compared to anything else we can access for trust fund support." The movement to an online grant management system is welcomed by the regional teams, although it is acknowledged that there may be some initial teething pains.

Two operational issues were repeatedly raised in interviews, both of which are related to ESMAP's growth, increased preferencing by donors, and movement toward programmatic ASAs. The overall message was that as ESMAP grows, it needs to continue to simplify processes to minimize transaction costs and maintain the level of technical support.

The first issue was that World Bank operational teams felt that ESMAP grant proposal review processes were becoming more complex and longer. Overall, operational staff felt that ESMAP reviews were paying increasing attention to whether proposals were a good "fit" for each of the windows. Particularly for grants that access multiple windows, the process of reviewing proposals is perceived as trending towards more burdensome since the grant must be reviewed by ESMAP staff in each of the windows. To be eligible for Powering Past Coal preferenced finance, for example, activities are expected to holistically address RE, EE, and ESR. Additionally, programmatic grants may also request higher levels of funding for a wider range of activities, and thus may require more scrutiny.

Regional and task teams recognize that ESMAP has a difficult job to integrate many different requests from client teams with the available, and often preferenced, funding from donors—and feel that ESMAP is overall managing this job well. But some WBG staff feel that ESMAP reviews have become, to some extent, more focused on donor eligibility issues than technical ones. One regional team member expressed that "donors have restrictions on the use of funds, so most comments are looking for alignment with donor requirements, rather than how to make it stronger from a technical point of view."

The second issue is that regional teams register difficulties with the predictability of available ESMAP funding in the various windows, especially near the end of the business period. While available resources are communicated regularly by ESMAP, several regional teams were taken by surprise by the exhaustion of available RE funding this year (apart from RE funding preferenced for Powering Past Coal) and called for more transparency in terms of available resources. The exhaustion of resources is a particular challenge for programmatic multi-year activities that expect annual tranche approvals to continue their work.

6.3. Implementation of past evaluation recommendations

This section addresses the extent to which ESMAP, during the current business plan period, has acted on recommendations and lessons learned presented in the previous evaluation. **Overall, ESMAP has implemented these recommendations.**

The first cluster of recommendations from the previous evaluation recommended that ESMAP should pursue program growth, while actively managing and monitoring threats to effectiveness associated with that growth. This included cautions about expanding ESMAP's number of programs and business lines and not letting soft earmarking affect efficiency or legitimacy. **ESMAP's continuous growth since then responds to this recommendation**, with disbursements increasing from about US$30 million in 2015 (including ASTAE) to US$40 million in 2019. However, **many of the tensions identified in the previous evaluation around the number of programs and soft earmarking are still relevant, if not more pronounced, today**. Although the FY17-20 Business Plan helped to rationalize the number of programs,[65] new programs and priorities have been identified and funded over the past several years, including Offshore Wind, the Hydropower Development Facility, and Clean and Efficient Cooling. The continued implications of soft earmarking are discussed in Section 6.2.2 above.

The second cluster of recommendations focused on strengthening outreach and coordination efforts at the WBG and country-level to enhance effectiveness, including through demand creation for newer

[65] In terms of the number of programs, two new programs were included in the approved FY17-20 BP: clean and efficient cooking and heating (in the EA cluster) and solar (in the RE cluster); these additions were offset by phasing out the Energy Assessments and Strategies program (folded into ABG), Climate Resilience, and Results-based Funding, which was integrated into other programs including ECCH. Two additional focus areas were also dropped from the initial proposed FY17-20 Business Plan (ESCALATE and Innovation Lab).

programs, inclusion of staff from GPs other than Energy, and opening up to the IFC. **ESMAP has acted well on this second group of recommendations.** In some cases, new programs arose from client demand (e.g., Host Communities and Refugees). In other cases, such as Offshore Wind, ESMAP teams have conducted substantial outreach to connect with emerging client interest. The Offshore Wind program was originally borne from a donor rather than client interest, but ESMAP's proactive outreach to both WBG staff and country clients has resulted in six grant requests already for high-emitting countries. Offshore Wind has also been effectively structured as a partnership with IFC, responding to the third part of this cluster of recommendations. With regard to the inclusion of staff from GPs other than Energy, ESMAP remains a highly flexible fund, open to task teams outside of the EEX GP. Numerous initiatives are also effectively managed in partnership with other GPs and IFC, for example the MTF (Poverty GP), ECCH (Health GP), ESR (Poverty, Macro, and Social), Lighting Global (IFC), and Efficient and Clean Cooling Program (Climate Change Group). Other programs have also closely collaborated with other GPs, such as Efficient and Sustainable Buildings (IFC Edge Program) and Energy Efficient Cities (Transport and Water GPs).

The third cluster of recommendations suggested that ESMAP continue to support and refine its approach to monitoring and reporting, including better tracking and reporting of influence on mobilizing private sector and non-WBG resources. This cluster also recommended more meaningful tracking of activity-level actions to address gender inequality in GRMs and follow-up on closed projects whose outcome category is still designated as "planned." **In response, ESMAP has made significant strides to strengthen its monitoring and reporting systems during this business plan period.** ESMAP has a new portfolio management team focused on these systems. A web-based activity dashboard has been completed and is operational on ESMAP's website; efforts are underway to extend this system to results reporting. ESMAP initiated annual progress reports for each of its thematic and cross-cutting areas, which provide updates on key achievements, status of activity implementation, achievement against business plan targets, and upcoming activities. The ESMAP team also launched an effort to track impact "tiles;" these tiles include WBG, non-WBG, and private finance informed by ESMAP activities and SDG7-related indicators such as number of people with access to energy, new RE generation capacity, and lifetime energy and fuel savings. In addition, a limited series of "impact stories" produced each year follow up on the on-the-ground results achieved by WBG operations influenced by ESMAP activities.

The previous evaluation's fourth recommendation was that the institutional arrangements for ASTAE should be finalized. **This recommendation was fully addressed with the ASTAE trust fund closed** and remaining resources transferred to the ESMAP main MDTF.

The fifth recommendation that ESMAP should develop a knowledge management strategy was taken up in the FY2017-2020 business plan, with the creation of an initial knowledge management workplan for the period. Knowledge generation, however, has been largely managed by the thematic and cross-cutting programs directly, with central dissemination and communication support. The 2016 Evaluation found that results and lessons learned from these activities are not systematically identified, captured or generated to inform broader learning. Some evidence of explicit capture and synthesis of lessons

learned is found in the program progress reports, especially for energy efficiency. The ESRF also has an activity to synthesize lessons from its activities. Other programs do so more tacitly.

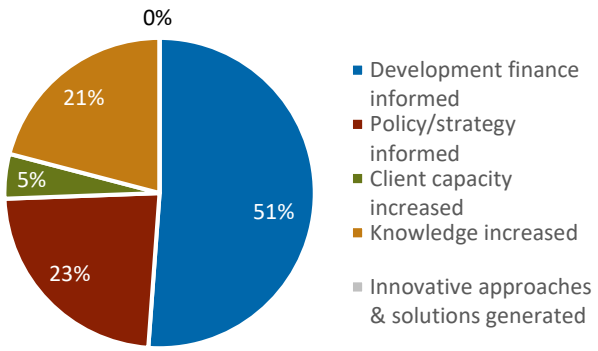
6.4. Results framework and theory of change

Overall, the Results Framework is relevant and consistent with the objectives of the ESMAP programs and cross-cutting solutions, as presented in ESMAP's Theory of Change for the FY17-20 period. The programs' objectives map well to the Results Framework indicators. Still, some opportunities for improvement were identified that may be relevant for the next business period.

First, **in a few cases, a core objective of a program was not well captured in the Results Framework.** For instance, for SEforALL TA, the program's objective is to increase the number of low-access countries that are enabled to mobilize sector-level finance on a scale required to achieve universal electrification. This ambition is not reflected in the indicator, which is much more bounded, in supporting countries to define and implement energy sector-wide approaches. Nor does the results reporting reflect whether countries are low access or have been able to mobilize sector-level finance. Similarly, the ESRF had an objective in the FY2017-19 Business Plan to not just increase the number of countries that reform energy subsidy, but do so "while mitigating the impacts on the poor and vulnerable;" this latter intention was not reflected in the indicators or the reporting against the indicators. This was somewhat rectified in FY2018, with the change in ESRF's objective to "assist client country governments to sustainably reform or reduce energy subsidies," reflecting the comprehensive approach the Facility takes, including social protection measures. In general, however, the CG's interest in support to the poor and vulnerable is not well represented in the Results Framework. Also notably, **as gender has transitioned to a cross-cutting program, it does not have expected outcomes at the Results Framework level**, nor have gender-related outcomes been mainstreamed into the thematic program outcomes (with the exception of one ECCH outcome).

Second, **the Results Framework for this business period may have over-emphasized World Bank operational lending.** This finding is based on the evaluation's review of the Results Framework and comparison with outcomes in the activity-level analysis, as well as interviews with World Bank management and operational staff. Interviewees emphasize the critical importance of upstream dialogue and policy influence and the regional and socioeconomic differences in terms of where ESMAP can inform lending (e.g., with energy lending typically lower in East Asia and LAC, see also Section 3.3).

Figure 6-2. Results Framework outcome indicators by category



The evaluation categorized the Results Framework outcome targets by the five major ASA outcome

categories, as shown in Figure 6-2. More than half of the Results Framework outcome targets are related to development finance informed, while in the activity sample, about a quarter of outcomes at GRM target this category. At the same time, outcome targets related to client capacity and policies/strategies informed are under-represented in the Results Framework relative to the activity sample. For example, outcome targets related to client capacity represent just 5 percent of the overall outcomes in the Results Framework, but 33 percent of the outcomes in the activity sample.

Capacity is particularly de-emphasized in the Results Framework. This is despite the fact that program descriptions and lessons learned emphasize the importance of institutional capacity for effectiveness and sustainability. For example, a key lesson learned in the FY2018 EE progress report was: "Capacity building and knowledge exchange are important enablers for energy efficiency implementation. Often good energy efficiency projects fail due to a lack of implementation capacity." Yet none of the EE programs' Results Framework indicators focus on capacity. Similarly, capacity building is one of the pillars of GGDP's activities but is not represented among the Results Framework outcomes. This suggests that **ESMAP may be lacking some oversight into important aspects of its theory of change, related to institutional capacity building**.

Finally, ESMAP donors are interested not only in World Bank lending informed, but also private sector investment. As discussed in Section 5.1.2, **ESMAP has contributed to some outcomes that may improve the private sector investment climate, but these outcomes are not typically characterized in this way, including at the Results Framework level**. This limits visibility into ESMAP's progress toward impact in this area.

The revisions to the Results Framework over the business period were reasonable and in keeping with the evolution of the program. Many programs did not substantially change their targets, including ABG, ECCH, SE4ALL TA, GFMG, Lighting Global, and Geothermal. A few programs revised upward to reflect their momentum and resourcing, including ESR, Efficient and Sustainable Buildings, and VRE/Solar Scale-up. RE Mapping appropriately revised downward to reflect a different approach to the program, shifting to preparing the Atlases rather than funding actual site measurements that can more directly mobilize finance (since other sources of funding are available for those activities). A target was also appropriately added for the new Hydropower Development Facility, with 3 countries targeted by FY20 with hydro projects ready for investment. However, targets related to number of WBG projects were not revised upward when Urban Poor was re-formulated into Host Communities and Refugees (HCR), even though these Urban Poor targets had already been achieved as of the launch of HCR in FY18.[66]

The Results Framework is reasonably coherent, although there is room for rationalization. It mixes to some extent outputs and outcomes, although each program measures at least one outcome. There is also some repetition in terms of counting number of operations and WBG funding to those operations—which represent a similar outcome. In the GFMG, the results reported against the targets for new World

[66] The Urban Poor target related to South-South exchanges was also removed when the program was re-formulated.

Bank operations informed, concessional finance mobilized, and countries identified for project identification and preparation count the same operations in three different ways. For example, GFMG support to the Niger Solar Electricity Access project is counted three times: as a lending operation informed, as IDA finance mobilized, and as a country supported for project identification and preparation.

In the FY2017-20 business plan, ESMAP programs also presented a coherent narrative view of the pathway toward impact for their activities. In addition to the issues raised above, which are also relevant to the theory of change, it is the evaluation's view that there is room for improvement in terms of the visual representation—being much clearer about what are ESMAP inputs/activities and outputs, and how and under what assumptions these are expected to lead to outcomes and impacts. Among the thematic programs, there is substantial commonality in terms of these inputs and pathways to change. However, the ABG and ESRF activities often play fundamental, supporting roles to the thematic programs that could be better connected theoretically (e.g., considering a country as a unit of analysis). ESMAP knowledge and the pathway to influencing private finance are also less well articulated in the Theory of Change.

ESMAP as a whole is challenged operationally to some extent in reporting by activities that are funded by multiple programs, as also addressed in Section 6.2.2 above, and as a result, the Results Framework is not additive. Given donors' interests in particular programs, this is not necessarily an issue. Program annual progress reports have also helped better identify the contributions of individual programs to outcomes, although improvements could be made in this regard. But the overlap in Results Framework reporting does make difficult to contextualize the overall outcomes of ESMAP, for example relative to the World Bank's energy lending portfolio in relevant areas, as a means of understanding the scope of ESMAP's influence.

7. Conclusions and Recommendations

7.1. Conclusions

Conclusions are presented for each of the DAC criteria for assessing development assistance programs, aligned with the Terms of Reference for this external evaluation: Relevance, Effectiveness, Efficiency, Impact, and Sustainability. This section also considers lessons learned and areas of focus for the next business period.

7.1.1. Relevance

ESMAP's interventions remain relevant in the context of the changed global landscape on energy, reflecting the goals of SDG7 and the Paris Agreement under the UNFCCC, and well-harmonized with emerging and existing global initiatives and institutions. ESMAP is seen as at the forefront of the sustainable energy transition, with its leading position globally and within the World Bank foremost

acknowledged in the energy access agenda. ESMAP has influenced a substantial portion of the World Bank's lending in energy access, renewable energy, and energy efficiency.

In the global energy landscape, ESMAP has been particularly influential in energy access, as the global convener and electricity access lead for SDG7 and a key actor in fostering an entrepreneurial ecosystem around off-grid solar and mini-grids in developing countries. ESMAP is also stepping up its engagement and profile in the underfunded clean cooking sub-sector. In renewable energy, ESMAP's global position is more focused on highly specialized products and initiatives—where it is internationally recognized for the global solar and wind atlases and geothermal energy publications, and as a leader in flagship initiatives in emerging technologies. In energy efficiency, ESMAP has not yet developed a global reputation, with its efforts instead predominantly Bank facing and linked to lending operations.

Within the World Bank, ESMAP's funding, knowledge, tools, and expertise, and hands-on advisory and operational engagement function as mutually reinforcing modalities that are seen contributing to accelerating the alignment of the Bank's lending portfolio with SDG7. This contribution is helped by ESMAP's central position as the umbrella trust fund for the EEX GP, its internal reputation for technical excellence, and the revolving door between ESMAP and operational staff. ESMAP's continued relevance will be related to its ability to engage with the broader processes of energy sector reform and sustainable energy transition, rather than be perceived as "just" a renewable energy, energy efficiency, and decentralized access program.

Over the business period, ESMAP has adapted its programming to remain relevant to emerging technologies and client needs. New initiatives on energy storage, solar risk mitigation, and offshore wind, new business models such as PPPs for mini-grids, and a new focus on financial viability of the power sector in low-income countries, have been taken up in response. The country case studies showed that, overall, ESMAP-funded activities are relevant and respond to clients' immediate and strategic needs, with examples of adaptive management to reflect changing priorities and circumstances.

7.1.2. Effectiveness and Sustainability

Overall ESMAP-funded activities have made good progress toward achieving both project-specific outcomes and Results Framework outcomes, especially related to development finance informed. World Bank lending operations represent a key pathway for ensuring sustainability of ESMAP results.

Three-quarters through the business plan, ESMAP programs appear on track to achieve the Results Framework targets by the end of the period. Program-level progress reports have helped support accountability for reporting against the Results Framework. At the activity-level, more than four-fifths of intended outcomes were achieved or partially achieved in closed activities, and three-quarters of closed activities were likely to achieve sustainable outcomes. Progress toward outcomes related to

development finance informed has been particularly strong, with a lower success rate for policy/strategy informed and client capacity increased.

The evaluation has shown that the way ESMAP works is critical for effectiveness. Key factors that are contributing to the effectiveness of ESMAP-funded activities are multiple and/or successive grants in a country and the coherence of ESMAP activities in a country (e.g., phasing of interventions, strategic linkages across thematic and cross-cutting programs, close linkages with WBG country strategies, taking a holistic or portfolio approach, and working across sectors and GPs). These factors point to the potential for programmatic engagement to drive results in the next business plan. Additional factors for effectiveness are ESMAP expert engagement with country teams and client governments (i.e., a more "hands on" approach and cross-support to operations), sharing experiences across regions, tailoring approaches to local circumstances, and maintaining cutting edge expertise that can be showcased with clients through technology- or solution-focused knowledge products. External factors that substantially influence the effectiveness of ESMAP-funded activities include political economy (especially for sector reform), market and regulatory environment, and government ownership and capacity.

These same factors also influence the sustainability of ESMAP-funded results, although sustainability is also closely linked to WBG lending operations, which are often used by ESMAP activities to ensure their benefits are continued after grant close. There has not been systematic follow up to examine the long-term effectiveness of this sustainability approach, and the country studies offered a limited view, given that many operations were just being implemented.

ESMAP's strategic approach to gender—working through its regional gender and energy programs to embed specific actions to close gender gaps into EEX lending operations—has been more effective in this business plan than attempts to screen for and mainstream actions to address gender inequalities into individual ESMAP-funded grants. The regional gender and energy programs have achieved substantial results with limited resources.

ESMAP's Theory of Change for the FY2017-20 period presented a coherent narrative view of the pathway toward influencing development finance, but there is room for improvement in terms of the visual representation, as well as being much clearer about what are ESMAP inputs/activities and outputs, and how and under what assumptions these are expected to lead to outcomes and impacts. ESMAP knowledge and the pathway to influencing private finance are less well articulated in the Theory of Change, as are the linkages among the cross-cutting programs (ABG, ESR, Knowledge Hub, Gender) and thematic ones.

ESMAP's Results Framework was relevant and consistent with the objectives of the ESMAP programs and cross-cutting solutions, as presented in ESMAP's Theory of Change. But the progress to date suggests that the Results Framework targets for these outcomes could have been more ambitious. In a few cases, a core objective of a program—from the Theory of Change—was not well captured in the Results Framework; nor were the outcomes of the gender program represented in the Results Framework. The Results Framework also over-emphasized World Bank operational lending.

A key area for further focus is quality of reporting in terms of ensuring that completion reports include outcome indicators, ABG grants clearly articulate how ESMAP outputs supported specific changes linked to lending operations, and outcomes rather than outputs are reported for country client capacity and knowledge indicators. The trend has been toward improvement.

7.1.3. Efficiency (Governance and Management)

ESMAP has maintained its cost-effectiveness while experiencing significant growth. Benchmarking of the program management and administrative costs shows that ESMAP is being delivered at comparable levels of efficiency to other similar programs. ESMAP continues to be efficiently and effectively governed and managed, although there is broad consensus that the current TAG model has not worked well over this business period. Some tensions are also being to emerge in the governance model that may require future attention.

Program management and administrative costs have averaged 5 percent—a cost level that is lower than the previous business period and on par or lower than comparator MDTFs in the WBG. Key factors contributing to this cost-efficiency are: acting as an umbrella trust fund for the EEX GP, the provision of operational cross-support by ESMAP staff (keeping ESMAP staff costs down), and streamlining of operational processes, including the use of an automated online system for grant management. ESMAP also leverages Bank budget to achieve efficiencies, although the data are inconclusive on the extent of such cost-sharing arrangements. Still, ESMAP staff remain overstretched, as was noted in the previous independent evaluation, as new programs and initiatives have launched without associated staffing increases and as increased preferencing of donor contributions raises the management and reporting burden on ESMAP staff.

ESMAP is seen by EEX GP regional and task teams as agile, flexible, and quick compared to other trust funds. But operational teams felt that ESMAP grant proposal review processes were becoming more complex and longer over this business period. Operational teams also raised difficulties with the predictability of available ESMAP funding in the various windows, especially near the end of the business period.

ESMAP's operating model is still effective, due in part to strong governance norms and pragmatic program management. The CG is an effective and appropriate governance model for ESMAP, as a multi-donor trust fund, and CG members feel that they are adequately consulted and heard by ESMAP management on the strategic direction of ESMAP. The TAG is seen by CG members and ESMAP management as having an important place in the ESMAP governance model, although the approaches taken to utilize the TAG during this business period have not met needs.

Over this business period, new donors and channels of contribution have surfaced, raising some areas to watch carefully over the next business period. One area relates to the balance of increased and increasingly specific preferencing of donor contributions, which requires more intensive management by the Secretariat, and the non-preferenced funding that is critical to allow ESMAP to implement its business plan with a margin of flexibility and meet emergent country client needs. Some CG members

raised concerns over the transparency of reporting on preferenced contributions and how ESMAP programs are funded. There are also concerns among CG members about membership norms rather than rules, which benchmarking shows that other similar programs have. CG members expressed some unease with the potential for members to influence the use of ESMAP funds, without contributing. So far, this has been pragmatically managed through closed sessions.

Another area to watch over the next business period is the emergence of more programmatic grants and ASA projects that put multiple activities under an umbrella to be flexibly managed. These programmatic activities offer some advantages for linking with WBG programming and adaptive management, and country case study evidence showed the potential for strong results, as in Ethiopia. However, programmatic activities also are likely to raise new challenges related to reporting and to the potential to finance activities that are less impactful but also less noticeable, given the complexity of the overall activity.

7.1.4. Impact

ESMAP has made substantial progress toward its mission to increase investment in energy access, renewable energy, and energy efficiency[67] three-quarter through its business plan. Through informing WBG lending operations, ESMAP has contributed to efforts that are expected to provide more than 76 million people with access to electricity, install 17.6 gigawatts of renewable energy, and result in 605 terawatt hours of projected lifetime energy and fuel savings—over 54 countries. ESMAP's impact on the poor and vulnerable is less straightforward to systematically discern.

The US$26.6 billion in WBG funding informed by ESMAP represents a substantial proportion of the WBG commitments to energy access, renewable energy, and energy efficiency. For example, in FY2018, the WBG committed US$1.4 billion to energy access,[68] of which two-thirds (US$930 million) was informed by ESMAP-funded activities. In FY2017-18, ESMAP informed nearly US$2.5 billion of WBG lending in renewable energy and energy efficiency.[69] Development policy lending operations also represent a sizeable proportion of the WBG finance informed by ESMAP (one-third by lending volume), although these operations often cover prior actions outside of the energy sector and thus the full amount reported may not contribute directly to SDG7. The country case study evidence largely validated the WBG development finance informed that is reported by ESMAP, with a few exceptions where timing or circumstances have changed.

Private finance reported as informed by ESMAP (US$8.1 billion) has been primarily associated with WBG lending operations, with larger amounts often linked to private capital and commercial lending in renewable energy and energy efficiency projects. The non-WBG finance reported by ESMAP is likely to

[67] As stated in ESMAP's Theory of Change for the FY2017-20 Business Plan.

[68] World Bank. (2019). *Energy Results*. Available at: https://www.worldbank.org/en/topic/energy/overview#3. Updated October 11, 2019.

[69] Total WBG financing for renewable energy and energy efficiency for FY2014-18 was US$11.5 billion.

be an underestimate, since the country case studies provided examples where ESMAP support has mobilized parallel finance not included in ESMAP's operation-linked reporting or has contributed to outcomes that remove barriers to eventual private investment in sustainable energy.

Informing WBG lending operations is the primary pathway through which ESMAP contributes to its intended impact to ensure access to affordable, reliable, and sustainable modern energy for all (i.e., SDG7). Worldwide, the 76 million people expected to gain access to electricity through ESMAP-informed operations represent about nine percent of the unelectrified global population as of 2017. The country case study evidence shows that the degree of impact relative to SDG7 targets differs by country, with notable ESMAP contributions in Ethiopia, Rwanda, Vietnam, and Niger. In Ethiopia, for example, ESMAP support led to WBG operations that could reduce the unelectrified population by more than 10 percent. In Niger, ESMAP support has led to a Government request for a Scaling Solar program that could shift the installed generation mix—which is currently all fossil fuel-based—toward one-fifth renewables.

ESMAP's impact on the poor and vulnerable is less clear. Few ESMAP-funded activities describe support focused on poor or vulnerable people, and ESMAP program progress reports also did not focus on these impacts. ECCH activities and ESRF grants focused on poverty and social impact analysis are surest in terms of these linkages.

7.2. Recommendations

This section provides evidence-driven recommendations for ways in which ESMAP could further improve the relevance, effectiveness, efficiency, impact, and sustainability of its programs and funded activities. For each general recommendation, a set of suggested specific actions is provided to enhance the utilization focus of the evaluation.

RECOMMENDATION #1: Maintain and strengthen ESMAP's relevance and influence within the World Bank and globally.

Suggested Actions:

- Continue the model of having ESMAP staff provide cross-support to operational teams. This approach provides two-directional benefits in terms of expanding and deepening ESMAP's reach into operational lending on one hand and bringing awareness of client needs and barriers into ESMAP's tacit knowledge bank on the other hand.
- Deepen engagement at the management level in the WBG to help drive change and interest for sustainable solutions, such as clean cooking, mini-grids, and energy efficiency. Finding ways to align these activities with management and task team incentives may help to accelerate the mainstreaming of these solutions into WBG lending operations.
- Ensure that ESMAP remains engaged with the broader processes of the sustainable energy transition and energy sector reform, to maintain its relevancy to country clients.

- To remain relevant in energy access: (i) ESMAP should expand its focus on addressing the affordability gap in off-grid access, in particular for stand-alone solar systems and lighting; and (ii) ESMAP continue to expand its focus beyond providing access to demand stimulation, in particular productive uses and economic development, which will require a multi-sectoral approach. This would also increase the viability of mini grids and on-grid electrification.
- In renewable energy, continue to support an integrated approach and link renewables support with the broader issue of viable national utilities and competitive procurement. ESMAP should continue to identify emerging technologies and generate demand within the WBG and with country clients for these innovations.
- In energy efficiency, consider ESMAP's strategic positioning and potential opportunities to drive the agenda internally and possibly externally, such as a flagship publication, which has been influential in other programs. ESMAP could continue to push within the WBG for further internalization of energy efficiency as a first fuel, and build on experience and successful examples of the previous business cycle to develop attractive and standardized packages that can drive resource allocation at the country office level, while pursuing strategic global and regional partnerships to raise the profile of energy efficiency in the decarbonization of economies.
- If the Energy Efficient Buildings program is continued, develop a more coherent strategy, based on the experience in the current business plan of addressing clients' needs and influencing the World Bank. Elements of an approach are emerging, for example developing a more standardized toolkit to help task teams engage with clients to identify opportunities and benefits, including a communications tactic, but there is a need for a narrative on how it all comes together. The experience during this business plan offers the opportunity for learning on what to carry forward and what to do differently. Such a strategy could address engagement at the policy level in client countries, standardized approaches/toolkits for engagement with clients, including for capacity building, and financing, among other areas.
- Continue the successful dual-pathway approach in the ESRF, of technical assistance and operationally oriented analytical work on the one hand and global coordination, knowledge development and experience sharing on the other. Consider an approach to knowledge generation in the next business plan that focuses on practical learning and sharing across countries, as well as a stocktaking of the ESRF's expansion into support to ensure utilities can be viable offtakers in low-income countries, to explore how this offering can grow even more effective and unlock barriers for sustainable energy development.
- Sharpen focus on the poor. If ESMAP's contribution to making progress towards impact in terms of energy access, renewable energy and energy efficiency for the poor is of special interest to donors, a poverty focus could be more explicitly considered in ESMAP's program design and reporting processes. As mentioned above, the country case studies and program deep dives showed that affordability is an area where ESMAP can make an important contribution—and an area that is closely linked to SDG7, impact for the poor, and gender-informed operations. The case study evidence also showed that developing highly tailored components can be intensive, suggesting that it may be good value-addition for ESMAP in relation to WBG lending operations.

RECOMMENDATION #2: Embrace the trend toward programmatic activities in the next business period, with consideration given to a set of priority countries in which substantial progress could be made toward SDG7.

Suggested Actions:

- Consider cohesive and successive grants on a country basis to drive results, including through programmatic activities. These activities could work across ESMAP thematic and cross-cutting windows, as well as across GPs and sectors, to take a comprehensive, but flexible approach. Activities could also benefit from more in-depth political economy analysis to sharpen the approach of ESMAP and the WBG, for example, to find optimal institutional entry points, anticipate difficulties, and develop better structured incentives and solutions. The WBG corporate push toward more programmatic ASAs may support this objective.
- Given that ESMAP resources are limited, ESMAP management and the CG may also wish to consider a set of priority countries for the next business plan. Criteria for selecting these countries might include those who are motivated for energy transition, view the WBG as a key partner in the energy sector, anticipate WBG lending in the sector, and where there is a TTL ready to champion the efforts, among other potential criteria. Such a prioritization need not limit the eligibility of other countries to receive ESMAP funding, as access to ESMAP resources by countries who may be less attractive to bilateral donors is seen by WBG operational staff as an advantage of the trust fund. Nor should it limit the availability of just-in-time grant resources, since ESMAP's flexibility remains a key advantage. Instead, the prioritization could signal a set of countries to pilot a multi-year programmatic approach, linked to the countries' SCDs and CPFs, building on strong diagnostics and a sector-wide perspective, and working across the ESMAP windows to take a holistic approach.
- These countries would offer an important learning opportunity for ESMAP. ESMAP contributions toward progress to SDG7 targets in these countries could be tracked and reported to the CG, and the TAG could play a role in learning lessons about this approach. Impact studies or post-completion reviews could also be considered for these priority countries.

RECOMMENDATION #3: Focus on a strategic approach to gender, a pragmatic approach to knowledge, and capacity building of national actors to support effectiveness.

Suggested Actions:

- Emphasize ESMAP's strategic approach to gender through the regional gender and energy programs, which seek to integrate specific actions to close gender gaps into EEX lending operations, among other objectives. Key areas of focus moving forward could be to ensure that actions to close gender

gaps are funded through scaled support to the regional gender and energy programs and to ensure that budget is allocated in lending operations such that actions can be carried out during implementation on the client end. While the process of screening of ESMAP proposals for gender mainstreaming could be maintained, it could be re-oriented to focus on identifying particularly ripe opportunities for better gender actions and ensuring "do no harm."

- For own-managed knowledge, continue to focus on knowledge products that demonstrate the WBG's leadership in emerging technologies and financial, business, and delivery models. There is demand for these types of products from operational staff and they have been shown to be influential with country clients. Flagship reports also have strong recognition and value as a global good and are influential in positioning the WBG as a knowledge leader; ESMAP should continue to produce such reports. ESMAP should also continue to leverage the WBG's hands-on operational experience in knowledge generation; this is an area of comparative advantage for the program.
- Ensure sufficient focus on capacity building of relevant national actors in the next business period to support outcomes, as well as sustainability of that capacity through operations. One area for increased capacity development is related to transfer of MTF skills in the countries where the MTF studies are conducted, to ensure greater impact through the integration of these tools and approaches at the national level. Enabling MTF to become a sustainable country-owned exercise (e.g., as part of household surveys run by the national statistics office) could be supported by the planned development of a shorter MTF module and user guide. Given how foundational MTF has been to changing mindsets and targets around energy access in some countries, consider releasing the MTF as a publicly available, global good tool that could be used directly by governments or other organizations.
- Relatedly, improve reporting on ESMAP's capacity building activities. Outcome baselines and targets could be clearer about what kind of capacity is being developed in what individual/entity, and care could be taken to ensure that outputs are not recorded as outcomes. Where appropriate, proposals and GRMs could also establish stronger linkages between ESMAP's capacity building activities and WBG lending operations (i.e., how the strengthened capacity might improve project results achievement), to help the influence of these activities. When capacity building is not linked to operations, efforts could still be made to establish the results implications by providing specific examples of the changes observed.

RECOMMENDATION #4: Rationalize ESMAP's theory of change and Results Framework for the next business plan and contextualize impact reporting.

Suggested Actions on the Results Framework:

- Consider more ambitious targets for number of WBG operations informed in the next business plan, given the extent of achievement partway through this business period. These targets could be partially informed by the number of active ESMAP-funded activities with an expected outcome to

influence development finance, extrapolated to the next business period, and the rate of outcome achievement as calculated by this evaluation. Increasing the targeted number of operations informed, however, should not be at the expense of other important outcomes (see below).

- Include targets in the Results Framework for the gender program. These could include, for example, the number or proportion of energy lending operations that are gender-tagged by each of the regional gender and energy teams, as well as amount of funding that is allocated by those operations for gender actions or hiring of a gender specialist for the implementation phase.
- Reduce the overlap in outcome targets (e.g., repetition in terms of counting number of operations, number of countries that have received support to prepare or implement an operation, and amount of WBG funding to those operations), opting instead for other meaningful program targets.
- Ensure that the substance of the ESMAP program objectives are well-represented in the outcomes monitored under the Results Framework. This could be accomplished, for example, by increasing the specificity of the outcomes in some cases to explicitly account for a certain focus (e.g., social protection, the poor, women) or the specific pathway of influence of a WBG operation (e.g., designing financial mechanisms for energy efficiency or business models for mini-grids).
- Ensure that the Results Framework outcomes cover outcomes focused on development finance informed, as well as policy/strategy informed and country capacity—to reflect the suite of outcomes targeted by individual activities, as well as the findings of the evaluation on the importance of capacity for sustainability. For capacity building outcomes, make a concerted effort to ensure that outputs are not reported as outcomes in individual GRMs, and encourage operational teams to describe how such capacity will be reinforced and sustained (e.g., through a lending operation or institutionalization of an approach).

Suggested Actions on the theory of change:

- Take a visual approach that better describes how ESMAP works and the outputs, outcomes, and impacts it expects to achieve. The role of ESMAP knowledge in driving change should be included. Risks and assumptions should also be articulated, and linkages among cross-cutting programs (ABG, ESR, the Knowledge Hub, Gender) and thematic programs should be made clearer. This visual could be accompanied by a narrative description of these inputs, outputs, outcomes, and impacts, and the causal mechanisms among them, with nuances included for the thematic and cross-cutting windows. The theory of change could also reflect the finding of this evaluation that successive and cohesive grant-making at the country level positively affects outcome achievement.
- ESMAP should strengthen its narrative around private sector finance mobilized. Many of the ESMAP programs have important linkages to maximizing finance for development. Being more explicit about the causal pathway from ESMAP intervention to mobilizing private finance would respond to donors' interests.

Suggested Actions for impact reporting:

- Continue to report ESMAP contributions to SDG7 goals based on the results of WBG lending operations that are informed by ESMAP activities. Where ESMAP-funded activities have contributed to specific components of those projects with specific results indicators (e.g., number of people to be provided with access to electricity through a mini-grids component designed by ESMAP, or the number of vulnerable people enrolled into an ESR-related social protection program), these specific results could be counted. However, the country case study evidence illustrated the challenge of dividing up the results of lending operations to account only for those aspects where ESMAP provided input; in most cases, it may be appropriate and defensible to count the entire lending operations, as long as a clear statement of influence can be provided.
- Consider contextualizing the scope of ESMAP's influence by placing the number of operations informed and WBG lending mobilized by ESMAP in relation to the WBG's relevant energy lending portfolio (e.g., in access, renewable energy, and energy efficiency). Similarly, the SDG7 related impacts could be put in context with national, regional, and global targets in Annual Reports. Such context could also provide a basis for informed discussions with current and potential donors about the areas where more resources could be useful and the areas where ESMAP is already engaged in most relevant lending operations.

RECOMMENDATION #5: Proactively and pragmatically manage for emerging tensions in the ESMAP business model.

Suggested Actions:

- Maintain ESMAP's flexibility and agility in the next business plan; these features are much appreciated by operational staff. To the best of its ability, ESMAP should keep Regional Coordinators aware of the projected availability of resources in each window, to avoid surprises or inability to fund sequential tranches of a multi-year project.
- Maintain the cost-efficiency of ESMAP, while recognizing that the expansion of programs is not compatible with zero staff growth, especially given the finding of the importance of hands-on support from ESMAP staff in certain programs, such as mini-grids and Lighting Africa.
- Ensure that ESMAP continues to receive a sizeable proportion of non-preferenced funding, to allow the program to implement its business plan and adaptively manage with a margin of flexibility. Related to this, ESMAP should increase transparency in financial reporting around how new initiatives are funded (i.e., with preferenced or non-preferenced funding), especially given the regular turnover of CG members. Progress has been made in this regard over this business period, but more transparent accounting is likely to give comfort to donors and potential donors.
- Proactively manage the transition to more programmatic activities and multi-window activities. Within the programmatic approval processes, ESMAP must be clear about what it is willing to fund and maintain a strong sense of what certain activities will cost, to ensure that programmatic activities maintain good value for money.

RECOMMENDATION #6: Define a new role for the TAG for the next business plan.

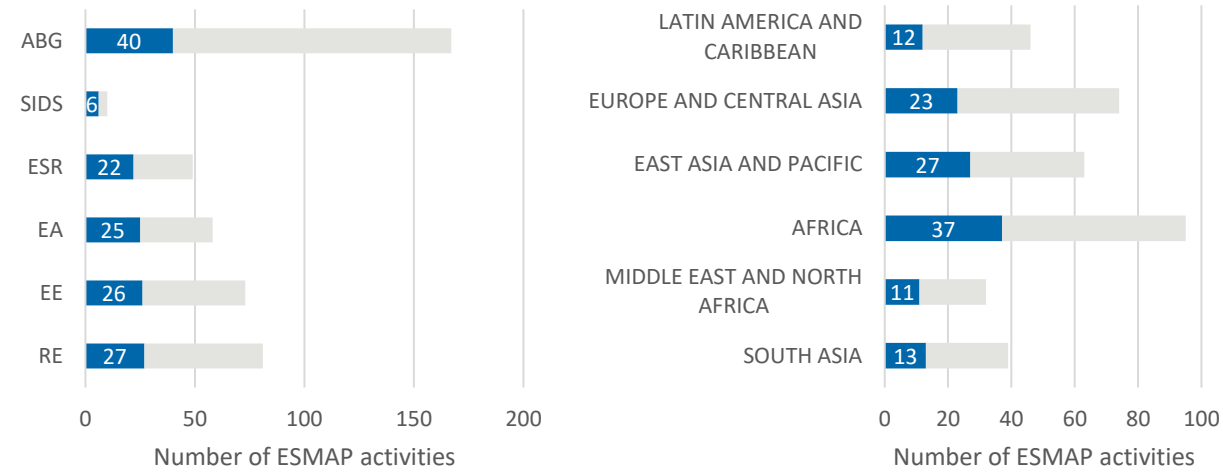
Suggested Actions:

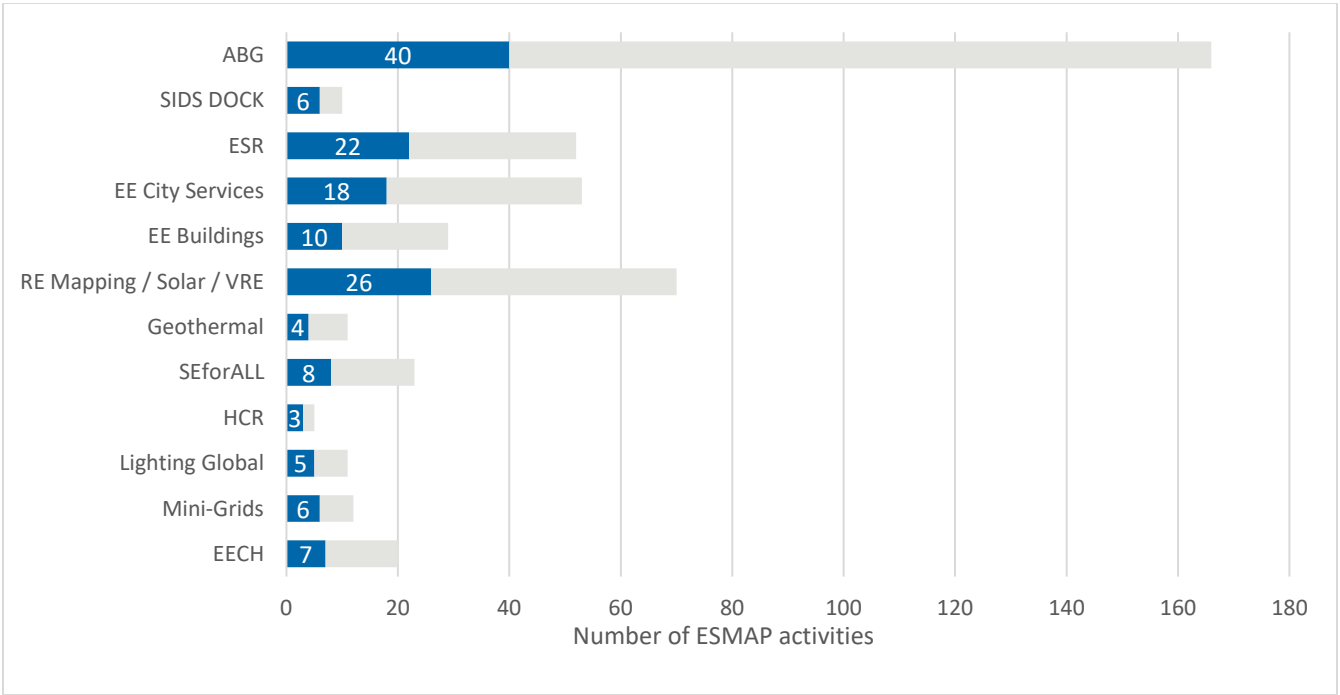
- Form a small committee of CG members and ESMAP management to develop a concrete proposal for the role of TAG during the next business plan. Such a proposal should recognize the purpose of the TAG, as reflected by CG members in interviews, to play an independent quality assurance function and serve as a strategic advisor, as well as the different skillsets that may be required for quality assurance versus strategic advice. The committee could consider the suggestion frequently raised in interviews to have the TAG do deeper assessments of ESMAP's relevance and results in specific thematic or cross-cutting areas, depending on the interests of the CG. The TAG could be staffed flexibly to meet these needs. As ESMAP moves toward more programmatic ASAs, the TAG could also play a role in ensuring value for money and progress toward impact.

Appendix A. Activity Sample

As described in the Inception Report, the evaluation conducted stratified sampling at the thematic level (EA, EE, RE, ESR, ABG, SIDS DOCK), ensuring coverage across priority programs. A total of 127 discrete activities were selected, although many of those activities included coverage of multiple ESMAP thematic areas and priority programs. Figure A-1 shows the characteristics of the activity sample as a proportion of the full activity population, by theme, region, and priority program.

Figure A-1. Activity sample by theme, region, and priority program





The sampled activities reviewed as part of the evaluation's activity analysis are presented in the table below.

Country/Sub Region	TF #	Fund Name	Grant Amount USD	Status	ESMAP Theme
Vanuatu	TF014991	Vanuatu Energy Sector Development Project	$825,722.00	Closed	SIDS
Central America	TF015217	Central America Clean Cooking Initiative (CACCI)	$1,143,286.00	Closed	EA
Dominica	TF013661	Small Island Developing States (SIDS) - Geothermal Development in Dominica	$795,000.00	Active	SIDS
Zambia	TF015888	Zambia Renewable Energy Resource Mapping Initiative	$3,600,000.00	Active	RE
St. Lucia	TF018391	Geothermal Resource Development in Saint Lucia SIDS DOCK BETF	$249,085.00	Closed	SIDS
China	TF018757	Urumqi District Heating Pricing Technical Assistance	$298,775.00	Closed	ESR
Cabo Verde	TF019384	Preparation & SPN of Cabo Verde Distributed Solar Energy Systems Project	$69,996.00	Closed	SIDS
Mexico	TF0A0331	Mexico Municipal Energy Efficiency Project	$149,980.00	Closed	EE
Uzbekistan	TF0A0712	Uzbekistan: Impact of Energy Subsidies - Way Forward	$293,959.00	Closed	ESR
Nigeria	TF017111	AFREA II Nigeria: Electrification Access Program Development - TA	$2,256,096.00	Closed	EA
Niger	TF017388	Niger Electricity Access Expansion	$445,000.00	Closed	ABG
OECS Countries	TF0A1673	PV demonstration Saint Vincent	$600,000.00	Active	SIDS
Bangladesh	TF017733	Analysis of Economy-wide Impact of Energy Sector Reforms in Bangladesh	$99,985.00	Closed	ABG

Country/Sub Region	TF #	Fund Name	Grant Amount USD	Status	ESMAP Theme
Congo, Democratic Republic of	TF0A1731	AFREA II: DRC-- Scaling Up Electricity Access	$695,652.00	Closed	Multi-theme
Sri Lanka	TF0A2028	Sri Lanka: Capacity Building For Planning and VRE Grid Integration	$129,411.00	Closed	RE
Egypt, Arab Republic of	TF0A0395	Egypt: Phase II of Subsidy Reforms TA from the Energy Subsidy Reform and Delivery TA Facility	$257,690.00	Closed	ESR
Liberia	TF0A2153	Liberia Renewable Energy Access Project	$249,743.00	Closed	EA
Kenya	TF0A2274	Kenya Geothermal Strategy	$526,702.00	Closed	RE
Kenya	TF0A2442	Kenya: Implementation Roadmap of Energy Bill	$457,000.00	Active	ABG
China	TF0A3021	Supporting implementation of new urbanization strategy in Chongqing	$300,000.00	Active	EE
Albania	TF0A3109	Albania: Project for integrated urban and tourism development	$147,759.00	Closed	EE
Kenya	TF0A3266	Kenya Geospatial Plan	$649,962.05	Active	Multi-theme
Vietnam	TF0A3653	Scaling-Up Solar PV in Vietnam	$173,766.00	Closed	RE
Belarus	TF0A3782	Belarus Heat Tariff Reform and Social Impact Mitigation Study	$199,455.00	Closed	ESR
Vietnam	TF0A3861	Vietnam Energy Efficiency for Industrial Enterprises GCF Proposal	$392,000.00	Active	EE
Brazil	TF0A3876	Revisiting Power and Gas Sector Reforms in Brazil	$500,000.00	Active	Multi-theme
Moldova	TF0A4088	Moldova - Just-in-time Support to streamlining of District Heating regulatory methodologies and processes	$76,791.00	Closed	ABG
Nepal	TF0A4111	Energy Tariff Reform in Nepal	$350,000.00	Active	Multi-theme

Country/Sub Region	TF #	Fund Name	Grant Amount USD	Status	ESMAP Theme
Congo, Democratic Republic of	TF0A4291	DRC Power Sector Report and Policy Dialogue	$79,732.00	Closed	ABG
Kyrgyz Republic	TF0A4426	Energy Efficiency in Public Buildings in Kyrgyzstan	$169,200.00	Closed	EE
Eastern Africa	TF0A4508	Solar Resource Mapping: East Africa	$800,000.00	Active	RE
Papua New Guinea	TF0A4546	PNG - National Policy on Benefit Sharing in Hydropower Projects	$192,000.00	Active	ABG
Brazil	TF0A4631	FinBRAZEEC Project Preparation	$200,000.00	Active	EE
Caribbean	TF0A4634	Caribbean Energy Sector Strategic Support	$150,000.00	Active	ABG
Turkey	TF0A4842	Turkey Geothermal Development Project (co-hosting of the 2nd IGC Turkey Geothermal Congress 2017)	$25,010.00	Closed	RE
Nepal	TF0A5377	Nepal: Project Preparation for Business Models for Private Sector-Led Mini-Grid Energy Access Project	$150,000.00	Active	EA
Kenya	TF0A5378	Model of Analysis of Energy Demand Survey and Preparation of a Comprehensive Study and Analysis on Energy Consumption Patterns in Kenya	$100,000.00	Active	Multi-theme
Montenegro	TF0A5826	Montenegro: Sustainable Energy Efficiency Financing for Public Buildings	$95,000.00	Active	EE
Burundi	TF0A5939	Burundi Landscape Restoration P - Biochar Systems	$100,000.00	Active	EA
Vietnam	TF0A6109	Accommodating the 20 GW Variable Renewable Energy Target for 2030 in Vietnam Power System	$123,187.00	Closed	RE

Country/Sub Region	TF #	Fund Name	Grant Amount USD	Status	ESMAP Theme
Malawi	TF0A6138	Malawi: National Electrification Strategy	$330,000.00	Active	EA
Vietnam	TF0A6426	Improving Energy Efficiency in Vietnam	$300,000.00	Active	EE
Bangladesh	TF0A0966	Bangladesh: Energy Efficiency Improvement Program in Industries	$148,064.00	Closed	EE
Myanmar	TF0A6611	Off-grid Access in Myanmar	$470,000.00	Active	EA
Vietnam	TF0A6819	Energy Efficiency Improvement in Water and Wastewater Management in Vietnam	$450,000.00	Active	EE
Jordan	TF0A6989	Jordan: Designing a Program for Energy Efficiency Improvement in Residential Buildings	$130,000.00	Active	EE
Egypt, Arab Republic of	TF0A1068	Towards Energy Efficiency Implementation in Cities in Egypt	$125,452.00	Closed	EE
Vietnam	TF0A7323	Vietnam: Preparing for LNG Imports	$240,000.00	Active	ABG
Burkina Faso	TF0A7359	Subsidy Reform in Burkina Faso	$80,000.00	Active	ESR
Egypt, Arab Republic of	TF0A1192	Programmatic Energy Reforms in Egypt - TA (P156023)	$532,535.00	Closed	ABG
Western Africa	TF0A7498	Electricity Subsidy Reform in Guinea, Mali, and Togo	$1,400,000.00	Active	ESR
Central America	TF0A7658	Dialogue on the role of regulators regarding fossil fuel subsidies in the transition towards the Energy Sector of the future	$75,000.00	Active	ESR
Belarus	TF0A7660	Belarus: Market assessment for the thermal retrofit of multi-apartment buildings	$100,000.00	Active	Multi-theme

Country/Sub Region	TF #	Fund Name	Grant Amount USD	Status	ESMAP Theme
Turkey	TF0A7701	Turkey: Sustainable financing mechanism for EE renovations in municipal buildings	$180,000.00	Active	Multi-theme
Yemen, Republic of	TF0A7769	Yemen - Support to Recovery of Electricity Services	$250,000.00	Active	EA
Solomon Islands	TF0A7860	Solomon Islands: Electricity Access and Renewable Energy Expansion Project	$1,600,000.00	Active	SIDS
Central America	TF0A8035	Upstream Analysis for the Development of the Scaling Solar Program in Nicaragua	$260,000.00	Active	RE
Mexico	TF0A8319	Opportunities for Geothermal Development in Mexico	$270,000.00	Active	RE
Zambia	TF0A8473	Zambia - Capacity Building for Integration of Variable Renewable Energy into Grid Operations	$150,000.00	Active	RE
Uganda	TF0A8691	Scaling Up Electricity Access in Uganda	$300,000.00	Active	EA
Mozambique	TF0A9015	Mozambique - Facilitating Financial Recovery of the Power Sector	$400,000.00	Active	ESR
Western Africa	TF0A9019	Piloting and promoting improved smoking ovens in West African Countries	$350,000.00	Active	EA
Vietnam	TF0A9131	Vietnam Power Development Plan: Supporting Activities	$290,000.00	Active	Multi-theme
Mali	TF0A9351	Accelerate access to electricity and increase of renewable energies in the Sahel region	$400,000.00	Active	EA
Ukraine	TF0A1656	Ukraine: Advancing Energy Tariff and Subsidy Reforms	$905,654.00	Closed	ESR

Country/Sub Region	TF #	Fund Name	Grant Amount USD	Status	ESMAP Theme
Moldova	TF0A9428	Optimization of DH System and Fuel Supply Options Study	$260,000.00	Active	EA
Ethiopia	TF018977	Renewable Energy Resource Mapping and Geospatial Planning: Ethiopia	$820,632.00	Closed	RE
Mongolia	TF0A4261	RENEWABLE ENERGY INTEGRATION FOR MONGOLIA'S WESTERN ENERGY SYSTEM (RE4WES)	$99,963.00	Closed	RE
Mongolia	TF0A4726	Ulaanbaatar Efficient Heating Project	$320,000.00	Active	EE
Mongolia	TF0A6244	Support For Sustainable and Socially-inclusive Electricity and Heat Pricing Reform in Mongolia	$165,000.00	Active	ESR
Mongolia	TF0A7786	Support to the Preparation of Electricity for Heating Program in Ulaanbaatar	$250,000.00	Active	Multi-theme
Ukraine	TF0A2267	Facilitating Electricity and Gas Market Reforms in Ukraine	$402,016.00	Closed	ABG
Ukraine	TF0A2466	Ukraine JIT - Advice to the design of EE fund	$29,972.00	Closed	ABG
Ukraine	TF017110	Ukraine: Energy Efficiency Transformation in Cities	$636,471.00	Closed	EE
Bangladesh	TF0A2737	Policy and System Requirements for Scaling Up Power Trade in Bangladesh	$38,082.00	Closed	ABG
Egypt, Arab Republic of	TF017302	Egypt Gas Regulator Capacity Building	$138,966.00	Closed	ABG
Ukraine	TF0A4102	Ukraine: Technical Assistance for the Ukraine District Heating Energy Efficiency Project	$127,050.00	Active	EE

Country/Sub Region	TF #	Fund Name	Grant Amount USD	Status	ESMAP Theme
Bangladesh	TF0A4113	Renewable Energy Resource Mapping Bangladesh - ESMAP	$200,000.00	Active	RE
Nigeria	TF017735	Unlocking Nigeria's Potential for Gas	$199,633.00	Closed	ABG
Bangladesh	TF018095	Open Accessibility Planning for Integrated and Inclusive Transport in Dhaka	$122,764.00	Closed	EE
Ukraine	TF018188	Ukraine: Moving Forward Energy Tariffs Reforms	$1,096,167.00	Closed	ESR
Middle East and North Africa	TF0A4262	Increasing Pan-Arab Regional Energy Trade	$243,873.00	Closed	ABG
Ukraine	TF0A4608	Market Assessment of Small Hydro Rehabilitation in Ukraine	$150,000.00	Active	ABG
Ukraine	TF0A5364	Ukraine: Advancing Energy Tariff and Subsidy Reform Implementation	$410,000.00	Active	ESR
Nigeria	TF0A6365	Nigeria - Preparation and Implementation Support for a Power Sector Recovery Program	$319,456.00	Closed	Multi-theme
Ukraine	TF0A6587	Support to Implementation of Reforms in Ukrainian Gas Sector	$140,000.00	Active	ABG
Ethiopia	TF0A1745	Ethiopia Energy Sector Review and Strategy	$800,000.00	Active	Multi-theme
Middle East and North Africa	TF0A7455	INCREASING PAN-ARAB REGIONAL ENERGY TRADE	$250,000.00	Closed	ABG
Ukraine	TF0A7544	Development of market compatible renewable energy framework in Ukraine	$150,000.00	Active	Multi-theme
Bangladesh	TF0A7683	Increasing the sustainability and efficiency of fuelwood supply value chain to increase access to efficient and clean cooking in Bangladesh	$270,000.00	Active	EA

Country/Sub Region	TF #	Fund Name	Grant Amount USD	Status	ESMAP Theme
Africa	TF0A3478	Lighting Africa	$2,580,952.00	Active	Multi-theme
Niger	TF0A3814	PV Hybridization of Diesel-based Isolated Grids	$273,000.00	Active	Multi-theme
Africa	TF0A8482	Lighting Africa ((Phase II)	$1,400,000.00	Active	EA
Vietnam	TF015250	Renewable Energy Resource Mapping and Geospatial Planning: Vietnam	$1,515,000.00	Active	RE
Vietnam	TF019381	VN Equitization and Divestiture Strategy for the Vietnam Electricity's Generation Companies	$144,415.00	Closed	ABG
Ukraine	TF0A4301	Ukraine: Sustainable Urban Mobility for Odessa	$148,694.00	Closed	EE
Ukraine	TF0A4548	Ukraine District Heating Sector Transition	$240,000.00	Active	Multi-theme
Vietnam	TF0A0913	Electricity Market Simulation Model of Vietnam	$311,008.00	Closed	ABG
Ethiopia	TF0A5155	Ethiopia Renewable Energy Resource Mapping	$3,159,368.00	Active	RE
Ukraine	TF0A5274	Ukraine Energy Efficiency Fund Development Technical Assistance	$750,000.00	Active	ESR
Niger	TF0A5303	Niger: Support to Innovative Financing Mechanisms and Business Models to Increase Access Through Solar Technologies	$180,000.00	Active	EA
Vietnam	TF0A1495	Vietnam: Energy Subsidy Reform Phase 1	$215,837.00	Closed	ESR
Niger	TF0A5830	Niger Solar Development - Zinder Project Pre-feasibility Analysis	$400,000.00	Active	RE

Country/Sub Region	TF #	Fund Name	Grant Amount USD	Status	ESMAP Theme
World	TF0A6187	IFC EDGE PROGRAM: CHINA, NIGERIA, AND CERTIFICATION FOR EXISTING BUILDINGS	$605,000.00	Active	EE
Vietnam	TF0A1683	Roadmap For Natural Gas Market Development	$149,973.00	Closed	ABG
Vietnam	TF0A2145	Electricity Vietnam (EVN) Communications Strategy For Tariff Reform	$174,058.00	Closed	ESR
Rwanda	TF0A6625	Rwanda: Power Sector Sustainability Study	$350,000.00	Active	ESR
Bangladesh	TF0A6626	Scaling-up Renewable Energy in Bangladesh	$198,000.00	Active	Multi-theme
Egypt, Arab Republic of	TF0A7309	Support for Egypt-WBG Partnership for the Design and Implementation of Solar PV Auctions	$44,954.00	Closed	RE
Dominica	TF0A7329	PREPARATION OF DOMINICA GEOTHERMAL RISK MITIGATION PROJECT	$70,000.00	Active	ABG
Marshall Islands	TF0A6578	Promotion of energy efficiency program Republic of Marshall Islands	$160,000.00	Active	EE
India	TF0A7227	India Capacity Building in Bus Fuel Efficiency II	$65,000.00	Active	EE
Egypt, Arab Republic of	TF0A7626	Egypt: Alternative Fuels and Raw Materials for Cement	$50,000.00	Active	EE
Dominican Republic	TF0A7456	TA for Distribution Grid Modernization and Loss Reduction in the Dominican Republic	$75,000.00	Active	EA
Nigeria	TF0A8119	Nigeria: Facilitating Implementation of Power Sector Recovery Program	$550,000.00	Active	ESR
Bangladesh	TF0A8133	Implementation Support for Bangladesh Clean Cooking Program	$400,000.00	Active	EA

Country/Sub Region	TF #	Fund Name	Grant Amount USD	Status	ESMAP Theme
Ethiopia	TF0A8195	Ethiopia: Electricity Subsidy Reform	$300,000.00	Active	ESR
Middle East and North Africa	TF0A8314	Increasing Pan-Arab Regional Energy Trade (Phase III)	$836,126.74	Active	ABG
Rwanda	TF0A8323	Re-energizing Agriculture through Solar Power in Rwanda	$200,000.00	Active	EA
Ethiopia	TF0A8434	Ethiopia Energy Sector Review and Strategy (II)	$150,000.00	Active	EA
Bangladesh	TF0A8470	Bangladesh Rural Electrification Program: Financial Sustainability Review	$440,000.00	Active	EA
Senegal	TF0A9395	Promoting operational and financial viability of the power sector in Senegal	$600,000.00	Active	Multi-theme
Dominica	TF013661	Dominica Geothermal Risk Mitigation Project	$795,000.00	Active	SIDS
Dominica	TF013661	Dominica Geothermal Risk Mitigation Project	$795,000.00	Active	SIDS
Mongolia	TF0A6386	Sustainable Energy Development in Mongolia	$132,000.00	Active	RE
Mongolia	TF0A7008	IFC: Energy Asset Rating for Mongolian Buildings	$150,000.00	Active	EE
Mongolia	TF0A7955	Support Mongolia with price setting of solar energy	$126,000.00	Active	RE

Appendix B. Stakeholders Interviewed

Affiliation	Name	Position
ESMAP Secretariat		
Program Management	Rohit Khanna	Program Manager
Renewable Energy Team	Oliver Knight	Senior Energy Specialist
	Zuzana Dobrotkova	Senior Energy Specialist
	Fernando de Sisternes	Energy Specialist
	Thrainn Fridriksson	Senior Energy Specialist
Energy Access Team	Dana Rysankova	Senior Energy Specialist
	Jon Exel	Senior Energy Specialist
	Tatia Lemondzhava	Energy Specialist
	Chiara Rogate	Energy Specialist
	Besnik Hyseni	Energy Specialist
	Ashish Shreshta	Extended Term Consultant
	Barbara Ungari	Operations Analyst
Energy Efficiency Team	Ivan Jaques	Senior Energy Specialist
	Martina Bosi	Senior Energy Specialist
	Aditya Lukas	Energy Specialist
	Tigran Parvanyan	Energy Specialist
	Daron Bedrosyan	Energy Specialist
	Tarek Keskes	Junior Professional Officer
Energy Subsidy Reform Team	Sheoli Pargal	Lead Energy Economist
	Thomas Flochel	Energy Economist
	Joeri de Wit	Energy Economist
	Yadviga Semikolenova	Senior Energy Economist, Co-lead of ESRF, ESMAP
	Sudarshan Gooptu	Co-lead of ESRF, Lead Economist and Global Lead, Fiscal Policy, EMFTX
Power Systems Planning Team	Debabrata Chattopadhyay	Senior Energy Specialist
	Samuel Oguah	Senior Energy Specialist
	Claire Nicolas	Energy Specialist
	Chong Song	Energy Specialist
Gender Team	Inka Schomer	Operations Officer

Knowledge Hub Team	Elisa Portale	Senior Energy Specialist
	Bryan Koo	Energy Specialist
Portfolio Team	Brenda Manuel	Senior Operations Officer
	Ilya Kaindin	Operations Analyst
	Anna Aghababyan	Operations Officer/ME&L Specialist
Communications	Nansia Constantinou	Communications Officer
ESMAP consultant	James Knuckles	
ESMAP consultant	Subodh Mathur	
Former ESMAP consultant	Dan Murphy	
Other World Bank staff		
Energy and Extractives Global Practice	Riccardo Puliti	Senior Director, Head
	Sudeshna Banerjee	Africa Regional Practice Manager
	Ashish Khanna	Africa Regional Practice Manager
	Wendy Hughes	Africa Regional Practice Manager
	Anna Bokina	Africa Regional Coordinator
	Charles Cormier	Africa Regional Practice Manager
	Jie Tang	EAP Regional Practice Manager
	Alan Lee	EAP Regional Coordinator
	Sameer Shukla	ECA Regional Practice Manager
	Almudena Mateos Merino	ECA Regional Coordinator
	Rafael Ben	LAC Regional Coordinator
	Silvia Martinez Romero	LAC Regional Coordinator
	Erik Fernstrom	MENA Regional Practice Manager
	Emmanuel Py	MENA Regional Coordinator
	Demetrios Papathanasiou	SAR Regional Practice Manager
	Defne Gencer	SAR Regional Coordinator
	Helle Buchave	EAP Gender and Energy Team
	Lisa Maier	LAC and MENA Gender and Energy Team
	Gunjan Gautam	SAR Gender and Energy Team
	Audrey Sacks	ECA Gender and Energy Team
	Mariano Gonzalez Serrano	Senior Energy Specialist
Climate Technology Program	Jean-Louis Racine	Climate Technology Program Global Lead
Poverty Global Practice	Gbemisola Oseni	
	Caterina Ruggeri Laderchi	

Social Protection Global Practice	Nithin Umapathi	
	Amr Moubarak	
Social, Urban, Rural and Resilience Global Practice	Catherine Lynch	Senior Urban Specialist
Health Global Practice	Tamer Samah Rabie	Senior Health Specialist
IFC	Russell Sturm	Lighting Global
	Corinne Figueredo	Head of Strategy and Finance for EDGE Green Building Transformation Program
	Jason Lee	Investment Officer
	Sean Whittaker	Senior Renewable Energy Specialist
	Etienne Raffi Kechichian	Senior Private Sector Specialist
	Stratos Tavoulareas	IFC Advisory (Retired)
Consultative Group		
United Kingdom Department for International Development	Steven Hunt	Senior Energy & Innovation Advisor, Climate, Energy and Water Team, Research and Evidence Division
Ministry of Foreign Affairs, The Netherlands	Frank van der Vleuten	Climate Change Team, Inclusive Green Growth Department (IGG)
Austria, Federal Ministry of Finance	Victoria Schreitter	Advisor, International Financial Institutions
	Seena Garcia	
Climate Works Foundation	Shilpa Patel	Director Mission Investing
Denmark Ministry of Foreign Affairs	Bo Jul Jeppesen	CG Member
Iceland Ministry of Foreign Affairs	Agusta Gisladottir	
	Engilbert Gudmundsson	Principal Adviser at the Directorate for International Development Cooperation
	Davíð Bjarnason	Director at the Directorate for International Development Cooperation
Rockefeller Foundation	Suman Sureshbabu	Officer
Norwegian Agency for Development Cooperation	Inger Anette Sandvand Dahlen	Senior Adviser
Switzerland Federal Department of Economic Affairs (SECO)	Nicole Merkt	CG Member
Switzerland/Azerbaijan/Poland World Bank ED's Office	Laurent Widmer	Adviser
UK BEIS	Ellen Paton	Programme Manager
SIDA	Patrik Stålgren	

Technical Advisory Group (TAG)		
TAG member	Budak Dilli	
TAG member	John Heath	
TAG member	Richenda Van Leeuwen	
External Organizations and Partners		
IRENA	Elizabeth Press	Director of Policy and Programmes
SEforALL	Ruchi Soni	Senior Energy Specialist
	Glenn Pearce-Oroz	Director of Policy and Programmes
	Brian Dean	Head of Energy Efficiency
SEforALL; Asia Clean Energy Partner	Mark Lister	Former head of the SEforALL EE hub; Managing Partner of Asia Clean Energy Partners
Alliance for Rural Electrification	David Lecoque	Senior Manager
AMDA	Aaron Leopold	Chief Executive Officer
IPEEC	Benoit Lebot	Executive Director
UNEP DTU partnership	Mathilde Brix Pederson	Project Manager
IISD	Peter Wooders	
IMF	Name withheld	
Oxford Policy Management Ltd	Ryan Hogarth	Lead Energy
Independent consultant (former World Bank)	Arun Sanghvi	

Country	Affiliation	Name	Position
Stakeholders interviewed as part of the country studies			
Ethiopia	Ministry of Water Irrigation and Energy (MoWIE)	Yiheyis Eshetu	Acting Director for Energy Policy, Strategy and Information
Ethiopia	Ethiopian Electric Utility (EEU)	Adefris Merid	Former CEO / Advisor
Ethiopia	MoWIE, with support from Government of Denmark	Nikolaj Svensen	Embedded Advisor on Energy at MoWIE
Ethiopia	World Bank	Richard Spencer	Program Leader, Eritrea, Ethiopia, South Sudan and Sudan
Ethiopia	World Bank	Lara Born	Energy Specialist
Ethiopia	World Bank	Rahul Kitchlu	Energy Sector Coordinator

Ethiopia, Rwanda	World Bank	Joern Huenteler	Energy Specialist
Mongolia	Ministry of Energy	Bavuudorj Ovgor	Head of Renewable Energy Division
Mongolia	Energy Regulatory Commission	Lkh. Jambaa	Director for Energy Market Research and International Cooperation Division
Mongolia	Energy Regulatory Commission	Ts. Ulziijargal	Senior Specialist, Market Research and Cooperation Unit, Price and Tariff Department
Mongolia	World Bank	Bekele Debele	Program Leader
Mongolia	World Bank	Peter Johansen	Senior Energy Specialist
Mongolia	World Bank	Yun Wu	Senior Energy Specialist
Mongolia	IFC	Ronald Wu	Head of Green Building Program (China & Mongolia)
Rwanda	World Bank	Ghada Elabed	Economist
Rwanda	World Bank	Yadviga Semikolenova	Senior Energy Economist
Rwanda	Ministry of Infrastructure (MINNINFRA)	Peace Kaliisa	Donor Coordinator
Zambia	Ministry of Energy	Harriet Zulu	Assistant Director of Energy
Zambia	Ministry of Energy	Mafalu Ziba	Principal Energy Officer
Zambia	World Bank	Christopher Saunders	Energy Specialist
Zambia	World Bank	Tigran Parvanyan	Energy Specialist
Egypt	Egyptian Electricity Transmission Company (EETC)	Lamya Abdel Hady	Head of Sector Private Projects
Egypt	League of Arab States	Jamila Matar	Director of Energy Department
Egypt	Ministry of Petroleum and Mineral Resources	Osama Mobarez	Under Secretary for Technical Office
Egypt	Egyptian Natural Gas Holding Company (EGAS)	Engy Adly	Contracts Department Head
Egypt	World Bank	Joern Torsten Huenteler	Energy Specialist
Egypt	World Bank	Alexander Johannes "Lex" Huurdeman	Senior Oil and Gas Specialist
Egypt	World Bank	Marwa Mostafa Khalil	Energy Specialist
Egypt	IFC	Alexander Larionov	Operations Officer - Resource Efficiency
Egypt	World Bank	Pedzisayi Makumbe	Energy Specialist
Egypt	World Bank	Sameh Mobarek	Senior Energy and PPP Specialist

Egypt	World Bank	Emmanuel Py	Regional Coordinator, MENA
Nigeria	Rural Electrification Agency (REA)	Damilola Ogunbiyi	Managing Director/ CEO
Nigeria	REA	Ifunanya Nwandi	Component Lead, SHS, NEP
Nigeria	Federal Ministry of Petroleum Resources (2015 – 2018)	Adegbite Adeniji	Senior Technical Adviser (Upstream and Gas Policy and Regulation) to the Minister of State for Petroleum Resources
Nigeria, Ukraine	World Bank	Ani Balabanyan	Lead Energy Specialist
Nigeria	World Bank	Rahul Kitchlu	Energy Sector Coordinator
Nigeria, Vietnam	World Bank	Masami Kojima	Lead Energy Specialist
Nigeria	IFC	Dennis Papa Odenyi Quansah	Program Lead, EDGE Green Buildings Market Transformation Program
Ukraine	Ministry of Energy and Coal Industry	Dmitry Tolmachov	Head of the Energy Sector Reform and Development Program Coordination Unit
Ukraine	Ministry of Social Policy	Vitalii Muzychenko	Deputy Minster
Ukraine	World Bank	Fabrice Karl Bertholet	Senior Financial Analyst
Ukraine	World Bank	Dmytro Glazkov	Senior Energy Specialist
Ukraine	World Bank	Feng Liu	Senior Energy Specialist
Ukraine	World Bank	Koji Nishida	Senior Energy Specialist
Ukraine	World Bank	Antonio Nunez	Senior Transport Specialist
Ukraine	World Bank	Yadviga Semikolenova	Senior Energy Economist
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Bangladesh	IDCOL	Farzana Rahman	
Bangladesh	IDCOL	Syeeda Yeasmeen Meer	
Bangladesh	World Bank	Amit Jain	Senior Energy Specialist
Bangladesh	World Bank	Jari Varynen	Senior Energy Specialist, Energy & Extractives
Bangladesh	World Bank	Joonkyung Seong	Senior Energy Specialist, South Asia Infrastructure
Bangladesh	World Bank	Andrew Mitchel	
Bangladesh	World Bank	Maria Beatriz Orlando	Lead Social Development Specialist

Bangladesh	World Bank	Md. Iqbal	Energy Specialist, Bangladesh Country Office
Dominica	World Bank	Elvira Morella	Senior Energy Specialist
Dominica	Ergo Consulting	Mark Tomkins	Project Manager Dominica Geothermal Project
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Kenya	World Bank	Patrick Balla	Senior Energy Specialist
Kenya	World Bank	Zubair K.M. Sadeque	Senior Energy Specialist
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Kenya	Ministry of Energy and Petroleum (MoEP)	Eng. Isaac Kiva	Secretary, Renewable Energy
Kenya	Ministry of Energy and Petroleum (MoEP)	Mungai Kihara	Chief Renewable Energy Officer
Kenya	Ministry of Energy and Petroleum (MoEP)	Chrispin Lupe	Chief Geologist
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Kenya	Geothermal Development Company (GDC)	Beatrice Kasgei	
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Kenya	Energy and Petroleum Regulatory Authority (EPRA)	Eng. Joseph Oketch	Director Electricity
Kenya	Energy and Petroleum Regulatory Authority (EPRA)	Edward Kinyua	Acting Director Petroleum and Natural Gas Directorate
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Niger	ANPER	Mai Moussa Mourima	Directeur Ingénierie
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Niger	ANPER	Amadou Halilou	Chef Technique
Niger	ANPER	Rabo Oubandawaki Mamane Tassiou	Coordinator
Niger	ANPER	Tahiou Amadou	Chef de Service
Niger	ANPER	Moumouni Mahamadou	Expert en Sauvegardes Environnementales et Sociales
Niger	ANPER	Isahac Esteve	Consultant
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Niger	Ministère du Plan	Garba Hima M. Bello	
Niger	Ministère d'Energie	Diallo	
Niger	Ministère d'Energie	Salouhou Hamidine	Directeur Général
Niger	Ministère d'Energie	Zakaouanou Houkou	
Niger	Ministère d'Energie	Balla Mahaman Rabiou	Directeur de la Promotion des Energie Renouverables
Niger	Ministère d'Energie	Aliou Aoudi Diallo	
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Vietnam	Electricity & Renewable Energy Authority (MOIT)	Nguyen Ninh Hai	Director, Renewable Energy Division
Vietnam	Electricity & Renewable Energy Authority (MOIT)	Nguyen Phuong Mai	Deputy Director
Vietnam	Electricity & Renewable Energy Authority (MOIT)	Phuong Hoang Kim	Director General
Vietnam	Electricity & Renewable Energy Authority (MOIT)	Tung	Official
Vietnam	British Embassy Vietnam	Le Bich	Climate Change Attache
Vietnam	Da Nang City Administration	Nguyen Thi Thuy Mai	Manager
Vietnam	Da Nang City Administration	Tran Huynh Vuong Hoai Vu	Manager
Vietnam	Electricity of Vietnam (EVN)	Bui Viet Ha	Vice Director
Vietnam	Electricity of Vietnam (EVN)	Cao Dat Khoa	Director
Vietnam	Electricity of Vietnam (EVN)	Nguyen Thi Lam Giang	Manager
Vietnam	Electricity Regulatory Authority of Vietnam (ERAV)	Pham Quang Huy	Deputy Director General
Vietnam	Embassy of Denmark	Tran Hong Viet	Senior Programme Manager
Vietnam	GIZ	Ingmar Stelter	Programme Director
Vietnam	Ho Chi Min City Administration	Luong Xuan Nhung:	Manager
Vietnam	Ho Chi Min City Administration	Nguyen Phuong Dong	Deputy Director
Vietnam	Institute of Energy	Nguyen Anh Tuan	Director
Vietnam	Ministry of Construction	Lien Huong	Director General
Vietnam	Ministry of Industry and Trade (MOIT)	Mr. Pham Van Tan	Deputy Director General
Vietnam	Ministry of Industry and Trade (MOIT)	Nguyen Thi Lam Giang	Director General
Vietnam	Ministry of Industry and Trade (MOIT)	Nguyen Viet Son	Director General

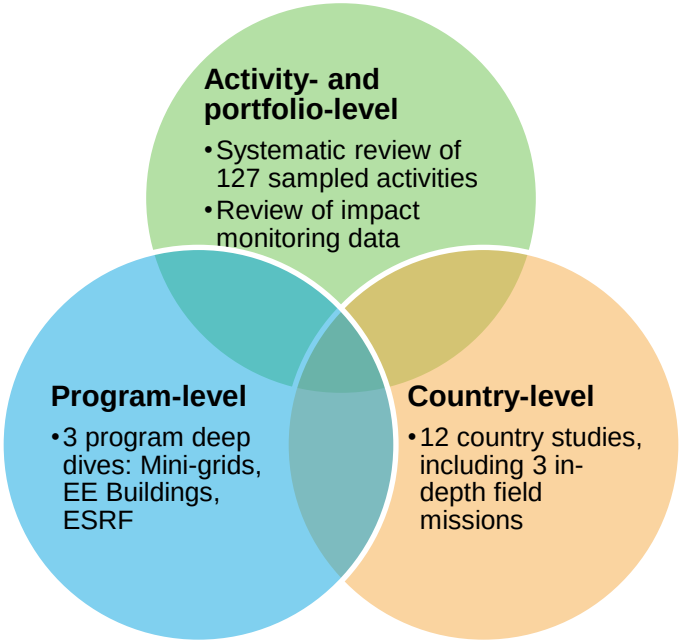
Vietnam	Ministry of Natural Resources and Environment (MONRE)	Hung	Official
Vietnam	Ministry of Natural Resources and Environment (MONRE)	Thanh	Official
Vietnam	USAID	Ha Dang Son	Principal Energy Advisor
Vietnam	World Bank	Abedalrazq F. Khalil	Senior Water Resource Management Specialist
Vietnam	World Bank	Debabrata Chattopadhyay	Senior Energy Specialist
Vietnam	World Bank	Mai Thi Hong Bo	Senior Communications Specialist
Vietnam	World Bank	Oliver Knight	Senior Energy Specialist
Vietnam	World Bank DC	David John Santley	Lead Energy Specialist
Vietnam	World Bank DC	Franz Gerner	Senior Energy Economist
Vietnam	World Bank Vietnam	Hang Diem Nguyen	Water Supply and Sanitation Specialist
Vietnam	World Bank Vietnam	Ky Hong Tran	Senior Energy Specialist
Vietnam	World Bank Vietnam	Rahul Kitchlu	Energy Sector Coordinator
Vietnam	World Bank Vietnam	Thi Ba Chu	Senior Energy Specialist
Vietnam	World Bank Vietnam	Tran Tan Hung	Senior Energy Specialist

Appendix C. Methods Note

The evaluation team adhered closely to the approach, methods, and data collection tools described in the Inception Report (July 2019). Below is a brief post-evaluation description of the data analysis methods and reflections on the suitability of the methods employed and limitations. For more information on the overall evaluation design, please refer to the Inception Report.

C.1. Data analysis methods

As described in the Inception Report, the evaluation took three analytical lenses to the evaluation: an activity/portfolio-level analysis, a country-level analysis, and a program-level analysis. This approach allowed for triangulation and cross-validation across analyses, as described below.



Activity- and portfolio-level analysis. The ICF team used a purposive sampling approach for the activity-level analysis, as described in the Inception Report and presented also in Appendix A above. The team reviewed grant documentation at proposal and implementation phases, including proposal summary forms (PSFs) and progress and completion grant reporting and monitoring (GRM) reports. A data extraction protocol was developed and systematically applied, looking at issues related to outcome achievement, outcome and sustainability ratings, risk identification and management, focus on gender and the poor, partnerships, and linkages to WBG operations. Text analysis was also performed on GRM reporting on lessons learned, to inform the analysis of factors that help and hinder outcome achievement. Approximately two-thirds of the activity-level sample (80 activities) was also covered by the country case studies, which allowed the evaluation team to further assess the validity of outcome achievement and other reporting; see also the discussion of country case studies below.

The evaluation also reviewed and analyzed the impact monitoring data reported by the ESMAP Secretariat, as well as the approach to generating such data. As for the activity-level sample, the country case studies enabled the evaluation team to directly assess the validity and contribution of ESMAP grants to approximately a third of the WBG funding volume reported as informed by ESMAP during the FY17-19 period. (See also the discussion of contribution analysis in the country case study analysis

methods below.) As noted in the main evaluation report, the team found that an ESMAP contribution could be identified for all but two lending operations included in the Secretariat's impact reporting in the case study countries (representing 98 percent of reported development finance informed in those countries). On this basis, the impact data reported by the Secretariat for the remainder of its portfolio (i.e., non-evaluation case study countries), excepting the two lending operations for which a contribution could not be identified, were included in the evaluation.

Country-level analysis. The country studies reviewed all ESMAP activities in a country during the evaluation period. The studies were guided by a country case study protocol and produced evidence that was catalogued in a systematic way. Team members wrote internal country reports, organized by the key questions/topics in the ToR that included relevance to country needs and priorities, outcomes and impacts, sustainability, gender considerations, and partnerships. Enabling and detracting contextual factors were also catalogued.

In the country studies, contribution analysis was used for assessing whether there were plausible associations between ESMAP's interventions and the observed outcomes and impacts, accounting for other contributory factors and roles of different actors in achieving results. In particular, the team assessed whether the contribution of ESMAP activities to a WBG lending operation could be clearly articulated and evidenced.

As noted above, the results of the country-level analysis were triangulated with the activity-level analysis of outcome achievement and the analysis of ESMAP impact monitoring data. In addition, because the country studies also used the ESMAP thematic and cross-cutting programs as a unit of analysis, the relevant portion of these studies were further used as input to the program-level studies (e.g., reviewing the evidence on mini-grids in Kenya), as described below.

Program-level analysis. The program-level analysis was designed to provide a more in-depth examination of how different ESMAP pathways of support (e.g., global knowledge, grants, cross-support to operations) combine to facilitate outcomes and impacts and how and to what extent the programs have contributed to transformational or ideational impacts on the WBG and outside the WBG. The analysis triangulated evidence from document review, the country studies, and in-depth interviews to develop key lessons for ESMAP.

Synthesis approach. The synthesis brought together evidence from the three levels of analysis, additional key informant interviews, and literature review. With evidence catalogued systematically, content analysis was conducted to identify recurring themes and triangulate findings. Triangulation was used as a means of assessing the strength of evidence behind the evaluation findings. Data analysis involved several team members for consistency. Several internal evaluation team workshops were held to jointly examine the data, identify evidence-based findings, and ultimately conclusions and recommendations.

C.2. Reflections on suitability of methods and limitations

Appropriateness of the approach and methods. The evaluation team found the three-lens approach quite useful for assessing ESMAP's performance at different units of analysis and felt the approach provided useful findings on how ESMAP works at a grant, country, and program level. It also allowed for cross-validation of results, allowing for stronger confidence in the evaluation's findings. Contribution analysis was also well-suited for the country case studies as it enabled the team to assess causal linkages in the absence of a counterfactual or available data that would have allowed more quantitative techniques.

Limitations and challenges. One challenge faced by the evaluation was non-response from country-level stakeholders for interviews, especially for the remote country studies. The evaluation team was able to speak to at least one representative of the client government in all nine remote case study countries; however, not all country client representatives responded to repeated requests for interviews, even with the assistance of the WBG country and task teams.

Another challenge related to the quality of reporting in GRM reports and changes in the proposal and GRM templates that were implemented over the course of the time period covered by the evaluation. To mitigate this challenge, the evaluation team developed its own procedure for determining whether outcomes had been achieved or partially achieved, as described in Section 4.1.2 of this report.

Another limitation related to the scope of activities as defined in the Terms of Reference. Because the evaluation was tasked to look at activities that were either approved or closed during this business period (FY17-20), many activities that had contributed to WBG lending operations were either in the early years of implementation (and thus not yet reporting much in the way of results achieved) or still in preparation. Thus, the development impact reported by the evaluation (e.g., in terms of number of people with access to electricity) is based on anticipated values in the WBG lending operations' results frameworks, rather than reporting of results achieved from WBG Implementation and Completion Reports.

Appendix D. ESMAP Regional Relevance

Africa

The World Bank has a large energy lending portfolio in Africa, and ESMAP has been most influential in energy access and renewable energy. In energy access, ESMAP's support for geospatial planning and its analytical work on demand estimates in Africa have helped countries to understand demand and aggregate demand, and informed national electrification strategies, least-cost electrification plans and investment prospectuses as key enablers of a sector-wide approach. The approach established a synergy across programs under the ESMAP energy access umbrella, including Lighting Africa, the Global Facility of Mini Grids and Clean Cooking and Heating. Some of the emerging outcomes are a more coordinated approach to increasing energy access, increased domestic and international funding and reduced risk for off-grid investments. Lighting Africa gave the Bank a broad perspective of the potential for developing modern off-grid energy markets in countries and allowed the piloting of different products in the off-grid market. The program is now seeking to replicate its East Africa success story in West Africa.

World Bank and ESMAP support for utility scale solar has been concentrated in West Africa, with just a few projects outside the region, including in Ethiopia and in North Africa in Morocco and Egypt. ESMAP provided significant technical support to the preparation of large-scale solar installations, either in the form of solar parks to be auctioned out to the private sector, or public-sector installations. One reason for the increased prospects of utility solar in West Africa, despite having small power markets (excepting Nigeria), is the ongoing discussion on interconnection and integration of different country grids, which would enable the absorption more VRE. In addition, the decreasing cost of battery storage will also play an enabling role in VRE integration.

According to interviews, the region will need more ESMAP support on financial utility performance, which is part is due to expensive procurement with IPPs that is dragging down the power sector in countries, to develop policy for competitive procurement, for power sector recovery plans and proper planning processes.

Eastern and Southern Africa

The resource mapping and MTF have been useful upstream work, and multiple projects are using these data. Clean cooking, which was a fairly neglected part of World Bank business, is now gaining more momentum. Much of the upstream work was done by ESMAP and as result the Bank was much better prepared to take on energy access, including off grid access and clean cooking. ABGs were used to inform reform options in Mozambique, and options for structuring the sector in Uganda.

ESMAP resources also enabled the Bank to work in fragile countries and fund upstream work, including in Eritrea, Somalia and Sudan. In Somalia, for example, ESMAP helped prepare a power sector master

plan, which was launched by the energy minister both in Somalia and Somali land. In these contexts, World Bank staff praised ESMAP for providing resources for ongoing policy dialogue in lending "off-years," as well as for being an equalizer, to ensure that some countries are not "forgotten."

West Africa and the Sahel

ESMAP has been a crucial tool in this sub-region, financing both upstream analytical work and helping with difficult downstream implementation issues, including structuring grid connected solar parks and mini-grid projects. An important influence in the region has been on the access agenda where ESMAP has helped develop electrification strategies and come up with off-grid business models that work.

ESMAP has been able to respond quickly to the needs of the region and allowed the Bank to work in fragile and conflict-afflicted countries by creating an activity to address the unique issues in the Sahel with its specific drivers of fragility. The G5 Sahel countries electrification rate is 26 percent, which is twice as low as the average for Sub-Saharan countries. ESMAP also supported a recent conference of the Sahel Alliance's Energy Group.

A significant contribution by ESMAP was made to the West African power pool, where it did the modeling of an optimal regional market, with expected impact on price and viability of utilities. ESMAP financed a working group on the West Africa power pool and a groundbreaking securitization of payment TA, which has led to a directive adopted by the Heads of State of Economic Community of West African States (ECOWAS). This directive is about to come into force and will be secured with a regional DPF. ESMAP was instrumental in financing the report but also providing staff for the modeling.

The region is finally making some headway on low-cost solar energy. Game changers have been funds for project preparation to bring down costs and low-cost debt financing; moving to solar auctions is expected to be a game changer as well. At the cutting edge, ESMAP conducted analyses on solar and battery storage systems in Central African Republic and the Gambia, and supported two innovative projects exploring possibilities of development of hydro-connected solar developments in four West African countries (Cote d'Ivoire, Ghana, Mali, and Liberia) related to existing hydropower dams. Both technical and institutional pre-feasibility of such installations is explored. These grants could over time catalyze multiple World Bank operations in these countries.

Middle East and North Africa

The MENA region is characterized by resource-rich economies that have seen a rapid increase in energy consumption, inefficient state-owned utilities and power sectors, and costly and inefficient energy subsidies. Yet there is growing interest in the region in renewables and in the removal of subsidies, and in attracting private investment in generation capacity.

ESMAP activities have been predominantly responsive to government priorities and have provided essential upstream analytical support, in particular on energy subsidy reform, and power sector reform. Due to the complexity of the region's energy sector issues, ESMAP's work has been very analytics heavy, and also mostly policy oriented, informing a comprehensive reform agenda in some countries, and less linked to infrastructure. According to Bank staff, the impact of the ESR window has been transformative in MENA, and ESMAP has been instrumental in the Bank's ability to drive its policy dialogue, such as in Egypt.

Aside from ESR, ESMAP has also financed energy efficiency and solar energy and utility scale energy storage assessments and pre-feasibility studies. ESMAP's expertise on battery storage is potentially very relevant in the region. The regional team also sees potential niches for ESMAP to expand the energy access window to fragility and conflict, which requires specific solutions, and in creating a platform for regional trade in power pools. The penetration of renewables would create new opportunities for regional electricity trade and power pools, provided that the necessary grid infrastructure investments take place.

Latin America and the Caribbean

In LAC, the VRE window has been important, and the region has also made good use of the energy efficiency windows. Several Central American and Caribbean countries accessed the geothermal window, informing World Bank operations in Dominica, Saint Lucia, and Chile. Also considered relevant are the efficient and sustainable buildings window, and industrial energy efficiency and cooling.

The region also faces some unique issues such as resilience in the power sector in the Caribbean. In FY18 ESMAP supported the flagship report on *Energy Markets in LAC: Emerging Disruptions and Next Frontier*, which provided a strategic regional view to help Bank task teams to identify interventions that could deliver more impactful results. ABGs are also seen as critical in LAC, because of ongoing power sector reform and the need to support regulators and operators in this process. In interviews, World Bank staff noted the need for more funds for these purposes, as well as for more TA funds to develop a pipeline of lending projects.

In LAC, there was also a perception among some interviewees that ESMAP's current results framework is designed for Africa and Asia, rather than for LAC or MENA, where the role of private sector is more important (see also Section 6.4).

South Asia

In South Asia, the window with the most demand is renewable energy (VRE integration, solar scale-up and resource mapping). **ESMAP has played a role in upstream development of country lending programs in the South Asia Region (SAR)** through the solar resource maps for India and Pakistan. The solar resource maps showed to decision makers in Pakistan how favorably the country's resource compares with several other countries that actively pursued solar development and helped facilitate the

development of solar projects in the lending pipeline. Similarly, resource mapping and TA support has contributed to the development of rooftop photovoltaic (PV) and solar park projects in Bangladesh.

In India, the sustainable and energy efficient building window has been relevant and effective; ESMAP funded technical assistance proved catalytic in facilitating WB lending to support the country in its ambitious scale-up of energy efficiency in key appliances, especially lighting, and ceiling fans. Offshore wind is a new area, with demand and activities in India and Sri Lanka and dialogue in Bangladesh. Demand for ABG exceeds what is available, and is used to support policy dialogue, sector reform and utility strengthening, allowing country teams to engage more on complex issues.

East Asia and the Pacific

ESMAP grants are prioritized for pipeline development, including through upstream analytics, in renewable energy and energy efficiency. In Mongolia, a district heating study led to a US$80 million program beyond the IDA allocation and ADB co-finance. In China, ESMAP analytical work played a critical role in the Bank's engagement on battery storage. ESMAP also provided very considerable support to Myanmar on access. The ESR window is also being used in Myanmar and in Mongolia, where it is integrated with overall analytical work. In Myanmar, ESMAP brought critical knowledge to the process tariff reform process.

Europe and Central Asia

Both the renewable energy and energy efficiency windows are important for the region, as well as ESRF. ESMAP provided support to enabling frameworks for renewable energy and large-scale solar, in particular, including support in preparation of auctions in Central Asia (Uzbekistan and Kazakhstan) and Ukraine. These auctions are expected to catalyze investments by IFC and other private sector players in these countries. ESMAP analyzed the viability of a large-scale rooftop solar PV program in Turkey and developed a roadmap for viable market segments. In the Western Balkan countries of Bosnia, Kosovo, Montenegro and Macedonia, where untapped EE potential in buildings is significant, ESMAP helped identify financing options and promoted customized interventions. ESMAP has also contributed to introducing more sustainable financing models, such as revolving funds, which are being adopted by an increasing number of countries, and also attracting funding from other donors.

The limitations on the use of ESMAP funds are however a constraint for addressing space heating with coal in the Western Balkans through replacement with gas. This is affecting the relevance of ESMAP in the region. For renewable energy scale-up, more support is needed for planning and strengthening the grid, as well as pricing, which need additional ABG resources, according to interviewees. One interviewee's view was that the renewable energy window needs to make more resources available for upstream work, especially given the limited availability of ABG funds, and be more flexible to support policy advice to prepare the market for projects that may only materialize several years later.