ESMAP Business Plan FY2017-20

PROGRAM PROPOSALS

WORLD BANK GROUP
Energy & Extractives
ESMAP
Energy Sector Management Assistance Program

September 2016

Contents

ESMAP Results Chain, FY2017-20

Sustainable Development Goal 13: Climate Action

SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all by 2030

World Bank Mission: End extreme poverty within a generation & boost shared prosperity

7.1: ENERGY ACCESS
Ensure universal access to affordable, reliable and modern energy services

7.2: RENEWABLE ENERGY
Increase substantially the share of renewable energy in the global energy mix

7.3: ENERGY EFFICIENCY
Double the global rate of improvement in energy efficiency

ESMAP Outcomes

Development Financing Informed, Policy/Strategy Informed, Client Capacity Increased, Knowledge Increased, Innovative Approaches & Solutions Generated

Cross-Cutting Solutions

ABGs for Governance, Markets, & Planning
- Preparation of 12 new investment and TA lending
- Mobilization of private sector investment and other non-Bank resources facilitated in 12 countries

Energy Subsidy Reform & Delivery TA Program
- 4 governments reforming subsidies
- Country assessments in 10 countries

SE4All Knowledge Hub
- MTF Global Survey
- GFT III]
- RISE II
- SEARII

Efficient Clean Cooking & Heating
- 6 cooking heating country program operations or activities developed in the lending portfolio
- 4 enterprises that are "new entrants" in a specific country or market segment

SE4All Technical Assistance Facility
- 7 countries have been supported in the definition & implementation of sector-wide approaches
- At least 6 existing geospatial plans improved

Global Facility on Mini-grids
- 5 new WB operations informed
- US$70 million of concessional funds mobilized

Urban Poor Electricity Access Program
- 5 new WB energy access projects supported
- 3 projects with expanded scope of beneficiaries

ESCALATE
- 4 large PPPs supported through ESCALATE reach closure
- Coalition of large corporations within the energy access space

Global Geothermal Development Plan
- 5 new WB operations informed
- Needs assessment in 5 countries

Renewable Energy Resource Mapping
- >8 external projects informed/ supported
- Target of >$25m in additional funding leveraged

VRE Grid Integration Support Program
- ≥8 new WB operations informed
- ≥ 10 country Planning Strategies informed

Solar Technologies TA Program
- Feasibility studies & project structuring completed for ≥10 investment projects
- ≥12 WB projects with solar off-grid components supporting growth of sustainable markets

Efficient & Sustainable Buildings
- At least 9 buildings-related WBG operations include sustainable energy components
- At least 13 country buildings-related policies/plans/strategies informed

Energy Efficient Cities Project Preparation Facility
- Support TA for ≥35 cities/regions/ countries
- Increased mobilization of finance from development partners

ESMAP Energy Sector Management Assistance Program

Energy Sector Governance, Planning, and Markets:
Annual Block Grants to Regions

SUMMARY

1

Problem Statement

- Energy shortages, high energy costs from inefficiency, or both, are slowing down economic development in many WBG client countries. Some have not been able to attract financing to maintain the existing infrastructure, let alone rehabilitate and expand it. Meeting the WBG's twin goals of ending poverty and building shared prosperity in a sustainable manner is not possible without reliable modern energy services.
- To overcome these barriers, policy reforms and institutional strengthening are required in the areas of Energy Sector Governance, Planning, and Markets (GPM).

Proposed Response

ESMAP will support effective energy sector policies and institutions through Annual Block Grants to Regions focused on governance, planning, and markets, including:

- Power Sector Reform:
  - TA to government bodies, regulators and system operators on effective institutional/governance structures for greater market efficiency, private sector participation, and technological innovation
  - Advice on regulatory incentives for expanded energy access
  - Advice on cutting-edge options for efficient and competitive market design
  - Advice on market structures and pricing conducive to VRE integration
- System Planning:
  - Support to programs/projects involving transfer of tools to clients + training
- Regional Integration of Infrastructure:
  - TA to power trade institutions

Strategic Context

Meeting the SDG7 2030 Targets of Universal Access, EE and RE Requires:

- Strong financial health of the power sector
- Adequate skills in system planning
- Predictable and independent regulatory frameworks which enable cost-recovery pricing
- Clear sector and market rules for new capacity addition, system operation and dispatch

Strategic Context

Annual Block Grants for Planning, Governance, & Markets are in high demand

1. Consistent Demand from the Regions for ESMAP Support in:
   - Utilities/Energy Sector Reform
   - Power System Planning
   - Regional Integration of Infrastructure
2. ESMAP's Comparative Advantage
   - ESMAP's long-standing record of engagement with countries on energy sector-wide assessments
   - GPM follows in the footsteps of EASP* in leveraging development finance*, as well as private sector investment
3. Linkage to ESMAP's Other Major Programmatic Themes
   - Clean Energy/VRE Integration/Energy Efficiency
   - Energy Access
4. Rich Scope for Interaction with the GSG Leads
   - Power Sector Reform/Markets
   - System Planning
5. Potential partnerships:
   - Governance GP
   - IFC

* Energy Assessments and Strategies Program (EASP) demonstrated that it is possible to influence a total of US$6.9 billion in WBG lending with about US$15 million in ESMAP program activities: see https://www.esmap.org/node/19

ACCOMPLISHED TO DATE: JORDAN DEVELOPMENT POLICY LENDING

THE CHALLENGE

- Increasing reliance on more expensive and less efficient fuel
- Government developed reform programs supported by DPLs to a ensure financially sound, sustainable and secure energy sector
- Needed technical assistance to support implementation of the DPL's energy components

THE RESPONSE

- ESMAP TA designed to help implement the $250 million DPL for energy and water
- Focuses on 5 key areas:

(i) Assessment of NEPCO's restructuring options to ensure its financial viability and sustainability; (ii) Review of NEPCO's Procurement capacity and procedures; (iii) LNG Capacity Building in LNG market; (iv) Analytical work on power system planning and renewable energy; and (v) a technical review of the Jordan Petroleum Refinery Company

THE RESULT

- TA already supporting implementation the DPL
- The TA activities target reforms under pillar 1 (financial viability of the electricity sector) and pillar 2 (increasing efficiency gains in the energy sector)
- TA directly contributes to the country's readiness for signing DPL2 in FY17

OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20

OBJECTIVES	ACTIVITIES	RESULTS - BASELINE	RESULTS - STRETCH
Increased number of countries with improved energy sector performance	**Conduct Diagnostic Assessments** ➢ Undertake sector assessments and advice for improving sector efficiency throughout the energy supply chain. Where possible, consider gender/social dimensions within assessments. **Provide Expert Advice and Technical Assistance** ➢ Provide advice to governments on appropriate governance mechanisms and performance incentives in legal and regulatory frameworks ➢ Provide TA and training to power sector entities and government bodies on effective power system planning techniques, tools and methodologies ➢ Provide advice to governments, regulators, and power sector entities on sector reform strategy, market design options, PSP models, and regional integration options ➢ Provide advice to governments, regulators, and power sector entities on regional integration options **Support Knowledge Exchange** ➢ Support knowledge exchange events such as workshops, seminars, etc., in the areas of energy sector governance, planning, and markets	• Country clients in 10 countries confirm using the results of ESMAP-supported energy sector assessments in policy decisions • Clients in 20 countries confirm enhanced institutional capacity to improve the performance of the power sector based on ESMAP's assistance/advice in the areas of energy sector governance, planning, and markets • Preparation of 10 new investment and TA lending operations facilitated using ESMAP's input on GPM • 10 existing operations informed • Mobilization of private sector investment and other non-Bank resources facilitated in 10 countries • Guidance developed on social/gender aspects of Power Systems (Utilities, Demand Side Management, Diagnostics). • Knowledge exchange on energy sector GPM facilitated with clients and other stakeholders in 20 countries	• Country clients in 12 countries confirm using the results of ESMAP-supported energy sector assessments in policy decisions • Clients in 25 countries confirm enhanced institutional capacity to improve the performance of the power sector based on ESMAP's assistance/advice in the areas of energy sector governance, planning, and markets • Preparation of 12 new investment and TA lending operations facilitated using ESMAP's input on GPM • 12 existing operations informed • Mobilization of private sector investment and other non-Bank resources facilitated in 12 countries • Guidance developed on social/gender aspects of Power Systems (Utilities, Demand Side Management, Diagnostics). • Knowledge exchange on energy sector GPM facilitated with clients and other stakeholders in 25 countries
	Budget (incl. ASTAE & AFREA residuals)	$40 million	$48 million
	Regional Allocations	AFR $14-19M ; EAP $7-9; ECA $4; LCR $4; MNA $4; SAR $7-8	

Risks/Success Factors

RISKS	MITIGATION
Strategic Mismatch: ESMAP's preferred areas for ABG support aimed at fundamental energy sector transformation may not find enough demand from Regions	Selection of thematic areas that represent natural extensions of established ABG priority areas
Lack of value added if targeted areas are already covered by Regions and/or GSGs	Adjustments to selected areas as necessary
Regional TF Programs displacing the need for ABGs	Regular portfolio reviews and consultations with Regions/GSGs

Energy Subsidy Reform & Delivery Technical Assistance Facility

SUMMARY

2

Problem Statement

Global spending on energy subsidies totaled $548 billion in 2013, draining public resources and reducing prospects for sustainable development in many poor and middle income countries. Despite being regressive and inefficient, energy subsidies are popular across income groups. Reforming them requires political resolve as well as careful attention to the immediate impact on the poor and on firm competitiveness, and strategic efforts to communicate the benefits of reform.

Proposed Response

This ESMAP initiative, started in 2013, has bolstered 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. It has also provided a space for governments to hear from each other's experiences, to encourage reform where governments may be uncertain about the likelihood of success.

In response to the strong demand so far, ESMAP proposes to expand its current technical assistance to governments, building on the successful work that has been done in a number of countries, in order to drive a first phase of reform to completion, while helping other countries in starting their effort on subsidy reform. A standardized framework for assessment of energy subsidies is also being developed to adopt a consistent approach to client engagement, while the knowledge exchange will be continued in order to deepen dialog among governments, both on a regional and global level.

STRATEGIC CONTEXT

Global spending on energy subsidies is large: $548 billion in 2013 (IEA 2014)

- In 2013, fossil fuel subsidies alone exceeded one percent of GDP in 31 countries

This creates many problems for governments and global climate change:

- Drain on public resources and crowding-out of other public investment
- Growth losses that result from inefficient allocation of factors
- Overconsumption of fossil fuels —increasing fuel imports, reducing incentives to use renewable energy sources
- Environmental impact from FF consumption, including increasing local pollution and greenhouse gas emissions in the process

Impacts of reform have to be identified and mitigated

- Impact on competitiveness - Perceived or real impact on competitiveness of energy intensive industries
- Impact on the poor – Households whose energy share of income is high may be highly affected, especially female-headed households
- Institutional & administrative capacity constraints - Difficult to identify & quantify subsidies, identify the poor…

Barriers to reform call for political marketing

- Very politically sensitive - Vested interests likely to oppose reform; public perception of entitlement, Low trust in sector/government
- Lack of information – The public may lack information about the size of subsidies or benefits of subsidy reform

Reforming subsidies *sustainably* is a major challenge

- Establishing a pricing mechanism that is depoliticized and that adapts automatically to cost fluctuations

Catalyzing Private Sector Investment:

- A financially sound energy sector should be more attractive for the private sector.
- Pricing energy sources right will level the playing field for financing for renewable energy projects

- Significant demand from governments for technical assistance to diagnose subsidies and design reforms
- Governments want to learn from each other's experiences with energy subsidies

Strategic Context

The World Bank is a unique partner for governments wanting to reform their energy subsidies.

- Wide ranging expertise: Assisting with all aspects of reform, from diagnostics to design to implementation
- Capacity building: Training country counterparts to develop analytics, design solutions and manage the implementation
- Global footprint: Drawing on lessons from global experience and network of experts
- Established relation with governments: Providing solutions anchored in political reality and current policy agenda
- Assistance and financing: Designing a strategy for reform and the means to achieve it
- ESMAP's role: Comparative advantage in supporting policy dialogue, influencing lending, and delivering global public goods through the World Bank
- The full package: Partnering with countries from diagnostics, to design, to implementation, including for better targeted social assistance mechanisms

Accomplished to Date: Country Engagements

THE CHALLENGE

- Energy subsidies comprise a large share of budget expenditures and GDP
- Major contributor to fiscal deficit
- Spending on subsidies often outweigh spending on social sectors

THE RESPONSE

27 total engagements: 21 country + 6 regional efforts, focusing on impacts of reform scenarios, communications strategy; and diagnostics of social protection mechanisms

- **Multi-disciplined TA support**: WBG teams comprised experts in macroeconomics and fiscal management, social protection and labor, poverty, and energy and extractives
- **Countries Supported**: Algeria, Armenia, Azerbaijan, Belarus, China (national, Urumqi), Egypt, Haiti, Iraq, Kyrgyz Republic, Macedonia, Madagascar, Moldova, Serbia, Tajikistan, Turkey, Ukraine, Uzbekistan, Vietnam (Reform, Communications), Zambia
- **Under discussion:** India, Mozambique, Western Balkans, Africa, Southeast Europe, Regional LAC study and TA in Central America, Regional MENA study and technical assistance on readiness of Social Safety Nets for compensating households for the impact of subsidy reform

THE RESULT

Egypt

The Government announced an electricity subsidy removal trajectory for next 5 years. The combination of price reforms and a steep decline in international oil prices brought down subsidies as a percentage of GDP from 6.6% in FY14 to a projected 3.3% in FY16, with the price reforms contributing an estimated 42% of the decline. The reforms set aside more than half of the subsidy savings for boosting expenditures on health, education and social protection. As a result, government spending on health and education outstripped – for the first time – spending on energy subsidies.

Ukraine

The Government announced increases in gas (470%) and heating (260%) residential tariffs, simplified social assistance mechanisms, approved a Gas Sector Reform Plan including energy tariff increases and strengthening of social assistance mechanisms. Media coverage of the reform improved.

ACCOMPLISHED TO DATE: KNOWLEDGE

CHALLENGES

Good practice examples of integrated and pragmatic approaches to energy subsidy reform covering all aspects of diagnostics, design, and implementation

RESPONSES

1. Energy Subsidy Reform Online Community (ESROC)

This secure online platform facilitates dialogue on ESR for a community of government officials, WBG and outside experts :

Community: 220 members from 31 countries, mostly government officials;

Online platform:

- Translated in Arabic, Russian, Spanish and English for use across regions;
- Discussion forum and "Ask an expert" feature for specific technical questions;
- Multimedia knowledge products: interviews, case studies, videos, blog posts

Webinars presented by government officials sharing their experience. Attended by an average of 70+ participants per session, almost all government officials, joining through VC with simultaneous translation from their local WBG country office across MNA, ECA, SSA or LAC. Past events include:

- Communication Strategies (Chile),
- Mobile Payment Systems (El Salvador),
- Social Assistance (Indonesia),
- Universal Cash Payments (Iran),
- India Series: 1. Biometric Identification Systems,
- India Series: 2. Curbing Leakages in LPG Subsidies,
- India Series: 3. Behavioral Change and the Give it Up campaign (upcoming)

2. Knowledge Exchange

Two major global conferences: Copenhagen (October 2014), and Washington, DC (April 2015) with the Friends of Fossil Fuel Subsidy Reform

Two regional workshops were held in El Salvador and Jordan

RESULTS

Peer to peer professional relationships under development

OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20

OBJECTIVES	ACTIVITIES	RESULTS- BASELINE $20 MILLION	RESULTS – STRETCH $24 MILLION
Increased number of countries that reform energy subsidies, while mitigating the impacts on the poor and vulnerable	• **Deploy Diagnostic Assessments** ➢ The Facility is leading a Bank-wide initiative to develop a multi-sectoral diagnostic tool. ➢ The tool will be developed in FY 16 and assessments deployed in client countries thereafter. ➢ A central support team will be housed in the Facility to assist teams deploying the assessment and conduct assessments. • **Deliver technical assistance to implement reform** ➢ The Facility will continue to support the analytical work on poverty, social, fiscal, macroeconomic, political economy, and climate change aspects of policy dialogue, consultations, communications strategies, and consensus building to design and implement reforms. • **Support knowledge and experience sharing among governments and experts** ➢ The Facility will continue to host regular events, and webinars/eDiscussions for the ESROC online community ➢ A Panel of Experts will assist country teams and client governments ➢ Data on subsidies and information on reform experiences will be documented through case studies and a database	• Country diagnostics in 10 countries. Country demand for further TA and/or implementation of reform following 30% of diagnostic assessments • Policy and/or regulatory reforms on energy subsidies and pricing reforms applied by at least 3 client countries • 3 governments reforming subsidies while balancing the political, economic, environmental and social consequences of reforms • The data generated compiled in an international dashboard tracking energy subsidies • 10 events produced per year; member participation on the platform of at least a third of government members • 300 members by the end of period • 3 significant known collaborations between governments/experts	• Country diagnostics in 10 countries. • Country demand for further TA and/or implementation of reform following 40% of diagnostic assessments • Policy and/or regulatory reforms on energy subsidies and pricing reforms applied by at least 4 client countries • 4 governments reforming subsidies while balancing the political, economic, environmental and social consequences of reforms • The data generated compiled in an international dashboard tracking energy subsidies • 10 events produced per year; member participation on the platform of at least a third of government members • 300 members by the end of period • 3 significant known collaborations between governments/experts
Budget	Indicative Programming Targets for TA ECA: $ 3-4 million LAC: $2-3 million Global: $2 million MNA: $3-4 million East Asia: $2-3 million Africa: $ 4-6 million South Asia: $2-3 million	Carry over funding: $ 10 million New funding request: $ 10 million	Carry over funding: $ 10 million New funding request: $ 14 million

Risks/Success Factors

RISKS	MITIGATION
The main risk that this program is likely to face, relates to the lack of public support, or political will, for engaging on energy subsidy reforms.	• Support for early and continuous dialog by Government with different interest groups, including those which may be adversely impacted by subsidy reform. • Assessment of a broad range of mitigation measures, such as social protection, unemployment benefits, etc., in order to address concerns of those likely to be adversely affected.
The framing of energy subsidy reform in the light of climate change could result in opposition towards such reforms, from countries that have large subsidies.	• This risk can be mitigated somewhat by highlighting the domestic benefits of subsidy reform which may be of more immediate importance for policymakers.
Advice and recommendations from the program may be difficult for client countries to implement, because of low institutional/technological capacity	• Ensuring that activities reflect appropriately the experience of similar country/regional context in the subject area to demonstrate the feasibility of specific recommendations, • Inclusion of suitable technical assistance alongside or as part of ongoing activity, to assist in building up institutional capacity.
The program potentially carries a reputational risk for the Bank, in that the Bank may be criticized for imposing policies on countries which could result in significant political opposition and unrest within the countries	• Outreach and dialogue with civil society and other stakeholders in the countries as well as globally. More critically, the Bank will have to be very careful both about its role on this subject as well as around the messaging on this program.

Sustainable Energy for All Knowledge Hub

SUMMARY

3

Problem Statement

Implementation of the SE4ALL initiative requires the development of key "global public good knowledge" products.

A knowledge hub is required to work on cross-cutting knowledge products that affect all three pillars of SE4ALL, leaving more detailed knowledge work to the relevant thematic hubs (e.g. Renewable Energy and Energy Efficiency). It is also necessary to facilitate the multi stakeholder partnerships needed to deliver these products on behalf of the initiative.

Proposed Response

The ESMAP SE4ALL Knowledge Hub initiative therefore leverages ESMAP's comparative advantage in working across the three SE4ALL areas (access, renewable energy and energy efficiency), and the ability to build multi-stakeholder partnerships

The World Bank—through ESMAP and the Energy and Extractives Global Practice—hosts the SE4ALL Global Knowledge Hub, which facilitates the creation, enhancement, and exchange of knowledge for the SE4ALL initiative.

Four key initiatives include:

- Global Tracking Framework (GTF)
- Multi-Tier Framework (MTF) for tracking energy access
- Readiness for Investment in Sustainable Energy (RISE)
- Status of Energy Access Report (SEAR)

ACCOMPLISHED TO DATE: GLOBAL TRACKING FRAMEWORK (GTF)

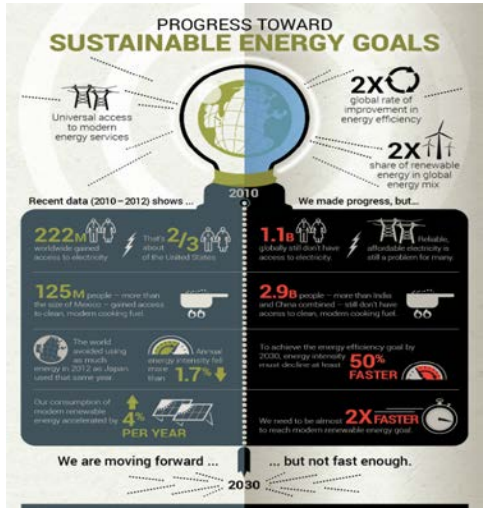
THE CHALLENGE

- Need of improving **data quality and availability** over time (in particular for access) to track progress toward SE4All and SDG7
- Biannual **monitoring and tracking** toward SE4All

THE RESPONSE

- ESMAP and IEA led a consortium of **23 international agencies** (donors, NGOs, multilateral institutions)
- 5 UN Regional Economic Commissions (ECLAC, UNECA, UNECE, ESCAP, ESCWA) are joining the GTF Consortium to build closer links to the regions and countries
- 2 GTF reports were published (2013, 2015)
- GTF data platform available online

THE RESULT



- More than **2,300 abstract views in the website**
- **GTF informed the SDG7** on "access to reliable and affordable energy services"
- **GTF aims at reporting progress toward SDG7:** has been formally proposed by the partnership to the UN Statistical Commission
- New methodology to track progress toward universal access with multi-tier approach (considering duration, quality of service, affordability, reliability etc.)

Accomplished To Date

Screening Frameworks to Track and Monitor Progress

- Global Tracking Framework (GTF)
- Readiness for Investment in Sustainable Energy (RISE)
- Beyond Connections: Energy Access Redefined (MTF)

Knowledge Management of Program and Policy Experiences

- State of Energy Access Report (SEAR)

PLANNED ACTIVITIES FY2017-20

2016
- SEAR I

2017
- MTF Global Survey (15 countries)
- GTF III
- RISE I

2018
- RISE II

2019
- GTF IV

2020
- RISE III
- MTF Global Survey(15 countries)

PARTNERSHIPS (I): GTF

PARTNERSHIPS (II):

All four activities will also help to leverage private sector investment through the provision of data (GTF & MTF), information on enabling environment (RISE), and analysis of best practices and promising business models for expanding access (SEAR)

MTF

RISE

SEAR

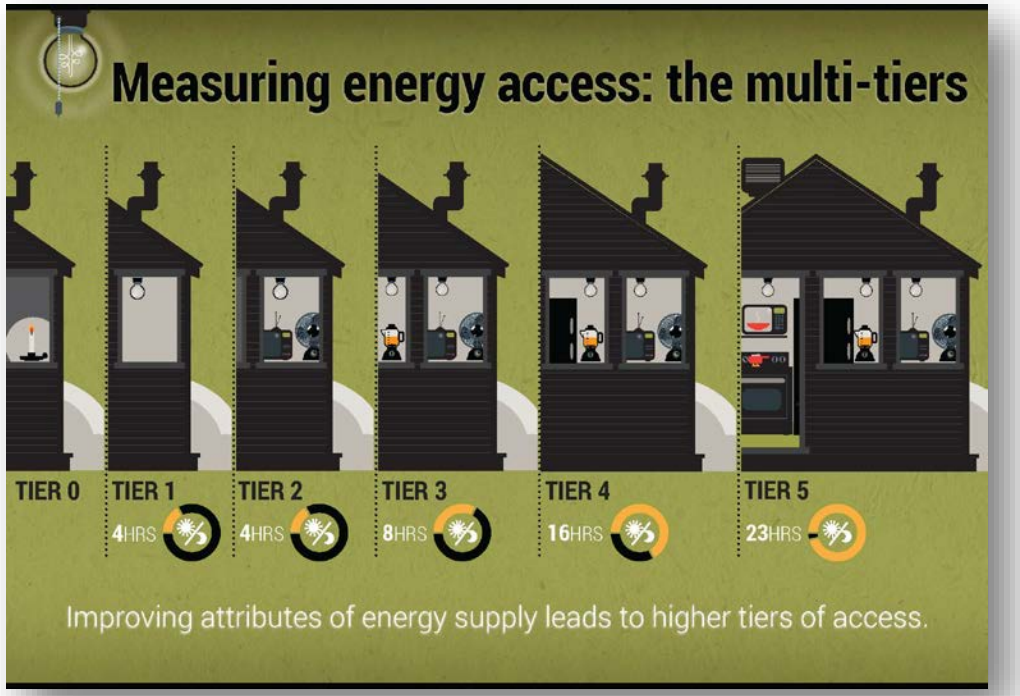
OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20: GLOBAL TRACKING FRAMEWORK (GTF)

OBJECTIVES	ACTIVITIES	RESULTS –BASELINE $	RESULTS –STRETCH $
Transition from SE4ALL to SDG7 Monitoring Promote progressive improvements in indicators and data availability	• Annual harvesting of outcome indicators for energy access, renewables and energy efficiency from global databases and updating of the global data platform • Annual monitoring and tracking of progress and reporting to the global community on SE4ALL/SDG7 • Analysis and monitoring of outcome trends at the global, regional and national levels • Identification of additional work needed to improve data quality and availability over time	Same as stretch scenario	• Improved monitoring, tracking of progress, and reporting to the global community on SE4ALL→SDG7 • 4 GTF Biennial reports and annual updates produced and disseminated Outcomes: • Policy, programs informed to achieve SDG7
Budget		Same as stretch scenario	New funding request: $ 2.2 million

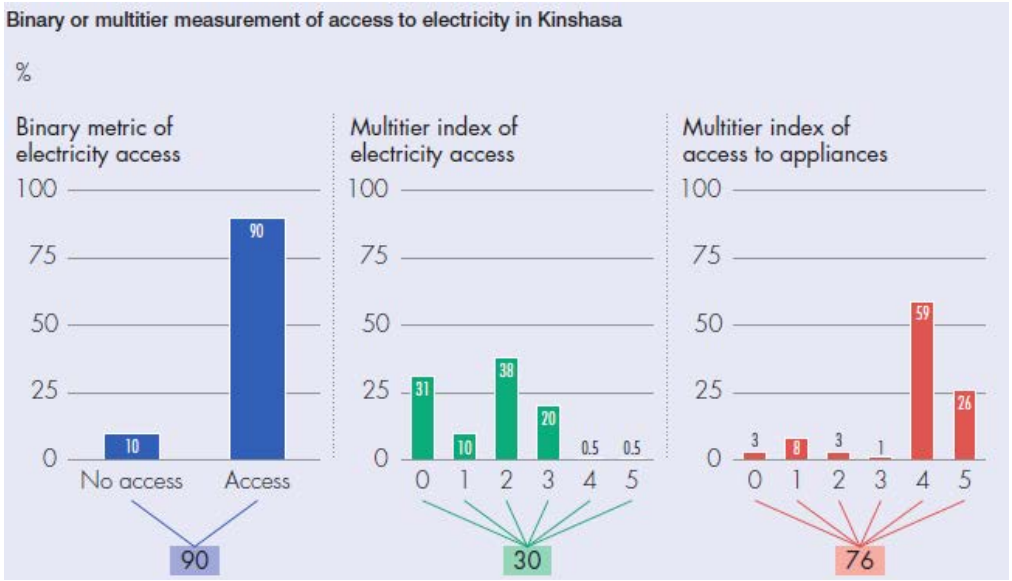
OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20: MULTI-TIER FRAMEWORK (MTF) GLOBAL SURVEY

OBJECTIVES	ACTIVITIES	RESULTS - BASELINE $	RESULTS – STRETCH $
Generate new and more meaningful data on which to measure progress toward affordable and reliable modern energy services using MTF approach Provide a diagnostic basis for designing strategic and cost-effective energy access program	Implementation of surveys to set up an MTF household energy baseline in 20-30 countries (10-15 by 2017, and additional 10-15 by 2020) Mainstreaming MTF approach (short MTF survey) in the regular National Household Surveys carried out by the National Statistical Offices (NSOs) - in partnership with WB survey group Capacity building for NSOs in the country – involving NSOs during the development of the baseline and capacity building for their tracking of progress through the National Statistical Offices Technology pilots for easier tracking: cell phone surveys, use of remote monitoring devices	Same as stretch scenario	**Immediate Results:** • 20-30 "Country Energy Access Diagnostic Reports", containing multi-tier detailed analysis of key indicators of energy access services by country • Open-Source Country Energy Databases on the website • Gender disaggregated data from baseline surveys **Long-term Results** • Monitoring platform for tracking progress to the baseline toward SE4ALL and SDG7: national household surveys generate MTF updates; Open Source Country Energy Database is in use **Outcomes:** • Broader adoption of MTF as the tracking tool for the universal energy access goals (Governments, development partners, private sector) • Improved energy access decision-making: energy access strategies, policies and program designs informed by MTF data
Budget		Same as stretch scenario	Carry over funding: $0.8 million New funding request: $3.2 million

Multi-Tier Framework for measuring energy access



In Kinshasa DRC, conventional access is 90%, but adjusting for service deficiencies score drops to 30%



OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20: READINESS FOR INVESTMENT IN SUSTAINABLE ENERGY (RISE)

OBJECTIVES	ACTIVITIES	RESULTS –BASELINE $	RESULTS – STRETCH $
Identify gaps in national policy frameworks supporting sustainable energy Catalyze effective policy reform by benchmarking country performance and providing examples of relevant good practices Become a premier source of global information on sustainable energy policies	The design of comparable indicators to evaluate national policy support for sustainable energy investments The collection and evaluation of laws, regulations and programs supporting sustainable energy in 110 + countries The development and updating of a website and data platform to make available results, source documents, and up-to-date sector information for each country Publication of a biennial report in 2018 and 2020 presenting results and key trends in the data, including the evolution of policies over time in 2018 and later editions.	Same as stretch scenario	More effective policies and support programs driving increased investment in renewable energy, energy efficiency and energy access infrastructure One-stop shop access to detailed, validated, and comparable country-level data on policy support for sustainable energy, legislation and regulations, and power sector structure and utility performance. An open web platform to encourage further analyses using RISE data, and a positive feedback loop to continuously enhance the quantity and depth of information available to policymakers, private sector, and the global sustainable energy community.
Budget		Same as stretch scenario	Carry-over funding: $0.5 million New funding request: $3.5 million

RISE INDICATORS (DRAFT)

	Policies and Regulations	Prices and Subsidies	Procedural Efficiency
Energy Access	❖ Existence and implementation of electrification plan ❖ Scope of electrification plan ❖ Grid electrification ❖ Mini-grids ❖ Stand-alone systems ❖ Affordability of electricity	❖ Utility transparency and monitoring ❖ Utility financial performance	❖ Time and Cost of Establishing a new household grid connection ❖ Time and Cost of permitting a new mini-grid
Energy Efficiency	❖ National energy efficiency planning ❖ Energy efficiency entities ❖ Information provided to electricity consumers ❖ Mandates & incentives: Utilities ❖ Mandates & Incentives: Public entities ❖ Mandates & incentives: Large consumers ❖ Minimum energy efficiency performance standards ❖ Energy labeling ❖ Building energy codes ❖ Financing mechanisms for energy efficiency ❖ Incentives from electricity pricing	❖ Fossil fuel subsidy for electricity generation ❖ Carbon pricing and monitoring ❖ Retail price of electricity (not scored)	❖ Time and cost of securing EE appliance standards certification
Renewable Energy	❖ Planning for renewable energy expansion ❖ Legal framework for RE ❖ Incentives & regulatory support ❖ Attributes of financial and regulatory incentives ❖ Network connection and pricing	❖ Fossil fuel subsidy for power generation ❖ Carbon pricing and monitoring ❖ Utility transparency and monitoring ❖ Utility financial viability	❖ Time and cost of permitting a new renewable energy project

OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20: GLOBAL STATUS OF ENERGY ACCESS REPORT (SEAR)

OBJECTIVES	ACTIVITIES	RESULTS – BASELINE $	RESULTS – STRETCH $
Support acceleration and scale-up of energy access efforts to meet the SDGs Raise awareness of emerging energy access trends and provide analytical support useful to energy access practitioners	Produce State of Energy Access, "synthesis report," including a narrative on trends, key energy access challenges and drivers, and best practice in financial and delivery models. Additional SEAR updates that focus on brief updates of key trends and emerging innovations/lessons during the 2-year reporting period, special features and case studies on relevant public and private access interventions Carry out impact evaluations to provide better evidence on impacts and their drivers Maintain a website with SEAR analytics and background documents, including case studies, special features, impact evaluations etc.	Same as stretch scenario	• Initial synthesis report in 2016 and periodic special topic updates and impact evaluations • A website updated periodically with background documents, impact evaluation reports, and information from case studies or special features Outcomes: • Evidence-based information on progress toward SE4ALL access goal • Policy and strategies informed by SEAR information, analytics and impact evaluations
Budget			Carry-over funding: $0.6 million New funding request: $1.2 million

SEAR 2016: Outline of Contents

Global State of Energy Access- Synthesis report 2016

- Executive Summary
- Chapter 1: Energy and Sustainable Development
- Chapter 2: Status and Trends of Energy Access
- Chapter 3: Building Blocks for Transformative Energy Access
- Chapter 4: Public and Private Financing of Energy Access
- Chapter 5: Energy Services Expansion and Clean Energy
- Chapter 6: Emerging and Innovative Delivery Models

Annex: **Summary of Special Features**

Additional:

Case Studies will be published as a complement to SEAR: Lessons from innovative public and private energy access efforts

Impact evaluations initiated, results to be reported in the next SEAR

SEAR Special Features

Name	Organization/Author
Contribution on Energy for the Agrifood Chain	FAO
The Climate – Energy Access Nexus	The World Bank
Role of Community Engagement in Achieving Energy Access Goals	ESMAP
Energy and Water	The World Bank
Energy Access and Renewable Energy	REN 21
Energy Access and Energy Efficiency	The World Bank/CLASP
Gender and Energy Access	ENERGIA
Energy for Cooking and Heating	The World Bank
Energy and Health	WHO
Electricity Planning	Mark Howells
Distributed Energy Services	IFC
Energy Practitioners Network	UN Foundation
Sustainable Energy Access Planning	Asian Development Bank
Energy Access and Emergencies: Reducing Disaster Risk and Building Resilience	FAO
Energy and Poverty	World Bank (DEC)
Results-Based Financing and Energy Access	SNV

Efficient, Clean Cooking & Heating Program

SUMMARY

4

Problem Statement

- Nearly 3 billion people worldwide use solid fuels in open fires and traditional stoves as the primary source of cooking and heating energy. Exposure to household air pollution from cooking and heating causes 4.3 million premature deaths annually, more than malaria, AIDS, and tuberculosis combined. Women and infants are most affected. The number of deaths from malaria, AIDS and TB is going down every year; the number of deaths from cooking and heating emissions is steadily rising.
- There are many other important negative impacts: drudgery for women and children collecting fuelwood; financial stress on poor households as cost of fuels increases; unsustainable use of biomass leads to local environmental degradation and net CO_2 emissions; emissions are a major source of black carbon (SLCP).
- A major, global effort is needed to change the trajectory, to be on track to achieve universal access to modern energy by 2030. According to the SE4All Global Tracking Framework 2015 report, access to clean cooking is falling behind population growth (-0.1% during the 2000-10 vs. 1.7% target growth required to reach universal access).

Proposed Response

4-year, $40m ESMAP program to increase access to Efficient, Clean Cooking and Heating solutions. Designed to build toward achieving health benefits, while explicitly recognizing that approaches and technologies that increase efficiency (even without significant emission reductions) can provide the opportunity to develop aspects of the stove/fuel-consumer interface, market and supply chain development, and incentive/public support mechanisms that are also relevant for targeting lower emission fuels and stoves. The program would catalyze:

- Innovation in technology, business models, results monitoring, results-based approaches
- Scaled up financing: WBG lending; other development partners; mobilizing new sources of public investment
- Significant, sustainable increase in private investment, and consumer demand and adoption

STRATEGIC CONTEXT

Nearly 3 billion people worldwide use solid fuels in open fires and traditional stoves as the primary source of cooking and heating energy. The combined energy use, health and environmental impacts impose tremendous direct and indirect costs on economies and households.

1. Health

Exposure to household air pollution from cooking and heating causes about 4.3 million premature deaths annually, more than malaria, AIDS and tuberculosis combined.

Broad range of chronic and acute physical ailments from firewood collection; burns suffered from open and other traditional cooking methods. Women and infants most affected.

2. Climate Change & Local Environment

Cooking and heating with solid biomass fuels has been identified as an important source of both GHGs and other climate forcing emissions such as black carbon.

Unsustainable use of biomass can be a contributor to land use degradation and localized deforestation.

3. Economy

- Reliance on biomass for cooking and heating forces women and children to spend hours each week collecting wood, billions of potentially productive hours that could be better spent on income generation, education, or other activities.
- Those who continue to cook with inefficient cookstoves dedicate a significant portion of their expenditures to increasingly expensive fuels such as charcoal.

4. Gender

- Women bear a disproportionate burden because of their primary responsibility for fuel collection and cooking duties.
- Women often lack a voice in household decision-making for switching to better cooking solutions.
- Potentially huge opportunities for women as entrepreneurs in this sector.

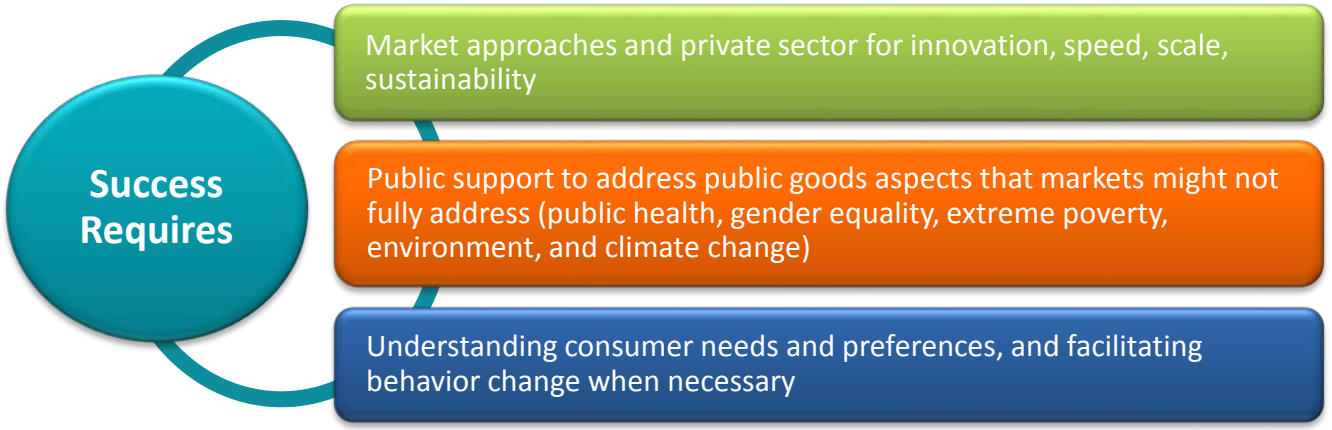
Strategic Context

Drivers, Interventions, and Outcomes in Different Sectors

- E.g., health benefits achieved through energy intervention
- Requires cross-sectoral approach: energy, health, environment, gender, climate change, private sector development

Heterogeneous Target Beneficiaries

- Rural and urban…poorest and not-so-poor population segments…. varied cooking practices… across almost all regions
- No "one size fits all" within a country or across countries. Innovation needed in technology, business models, consumer behavior change



Solid Starting Point

- Knowledge products and on-going engagements
- Appetite for innovation
- Track-record of catalyzing progress in new and difficult areas; and convening and coordinating among interested parties

Ability to Leverage WB and IFC

- High-level government engagement, dialog, and expertise across relevant sectors
- Private sector engagement and know-how in business development and consumer financing
- Ability to mobilize large-scale public and private investment, from WBG and others

ACCOMPLISHMENTS: WB AND ESMAP HIGHLIGHTS

Mobilizing Lending in WB Operations

China Hebei Air Pollution and Prevention and Control Program

- ECCH supported the development of a baseline study and the disbursement-linked indicators for preparing the design of household cooking / heating component of a new P4R lending operation in China.
- Originally the project did not include this component. The component was included as a direct result of ESMAP support and has mobilized **$80 million in IDA lending for more efficient, cleaner stoves for cooking and heating** (project on track for Board approval in June 2016)
- The above project is led by the Environment GP as part of the ECCH program effort to impact operations across sectors and enhance coordination.

Developing Gender-sensitive and User-Centric Approaches

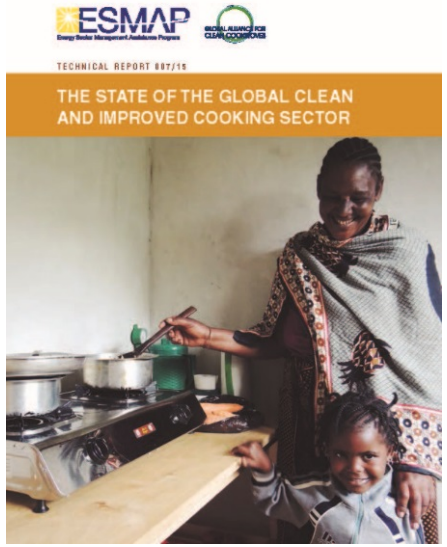
Indonesia Clean Stove Initiative

- The ESMAP support to the project helped develop an innovative stove testing method that incorporates local cooking practice and preferences based on anthropologic research and comprehensive household surveys that incorporate detailed social and gender aspects.
- Building on the above activities, the ongoing support from the ECCH program is financing the implementation of a new business model using **Results-Based Financing (RBF)** to increase adoption of culturally accepted and extensively tested stove models.

Mainstreaming across Sectors

Lao PDR Cookstove Initiative and Health Project

- The project, supported by ASTAE, brought the Ministry of Energy and Mines and the Ministry of Health together in a unique collaboration to improve the health and economic wellbeing of the rural poor. The piloted activities will continue to be supported under an upcoming World Bank Health sector lending project.
- As a result of the highlighting the importance of the above Laos Clean Cookstoves work, an on-going World Bank Education Sector lending project will now include financing for **3000 institutional best-in-class stoves**.



Major Knowledge Products

- *State of the Global Clean and Improved Cooking Sector* (2015)
- *Clean and Improved Cooking in Sub-Saharan Africa* (2014)
- *One Goal, Two Paths: Achieving Universal Access to Modern Energy in East Asia and the Pacific* (2011)

GOING FORWARD

Increased focus on mobilizing private sector investment, innovation, and risk-taking

Getting the environment right for the private sector

- Analytic work - *Health, wealth, and growth: why lowering cookstove trade barriers makes sense* (forthcoming FY16)
- Country-program assessments of status and opportunities for private sector engagements (e.g. ASTAE-supported FY16 work in India)
- Developing approaches to remotely- generated, open-source data on cooking practices and preferences (e.g. ASTAE-supported FY16 work in India)

Piloting approaches to attract private sector investment (e.g. through results-based financing)

- Through project design, providing market based incentives for private sector distributors, manufacturers, financial intermediaries to become new sector players: E.g. **Uganda - *Distribution Challenge Fund*** – a competitive grants program focusing on removing key barriers to the cooking sector supply chain and providing market incentives for integration of manufacturer-distributor commercial consortia. The program is initially targeting 100,000 households with high quality, field-tested industrial cookstoves through both upfront and Results-based Financing triggers.
- **Indonesia** – piloting a Results-based Financing approach to mobilize private sector investment. Qualified stove suppliers assume investment and performance risks but receive subsidies based on their achievement of set results.

Monetize Climate Change, Health & Gender co-benefits of Efficient, Clean Cooking & Heating

- Connect funding targeting impacts in health, climate and gender to the Efficient, Clean Cooking and Heating sector. The result-based approach means that forward commitments to purchase health, climate and gender impact (e.g. through public or impact investor funding) will mobilize significant private financing and risk-taking to further scale up investment in the sector to generate the saleable impact units. E.g. In **Lao PDR** a three month pilot tested the methodology for measuring the averted disability adjusted life years (ADALYs) from reduced level of exposure to HAP resulting form use of advanced gasifier cookstoves. The ADALYs can be monetized and sold to private sector investors.

Leveraging private sector investment through the Green Climate Fund (GCF)

- The ECCH program is currently preparing a proposal for a four-year Program to expand clean cooking operations in Bangladesh, Guatemala, Indonesia, Lao PDR, and Uganda and through this investment further leverage private sector participation. The program is a joint proposal between the World Bank, Energising Development and the Global Alliance for Clean Cookstoves.

OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20

OBJECTIVE	ACTIVITIES	RESULTS – BASELINE $	RESULTS – STRETCH $
Increased number of WBG country operations supporting access cleaner, more efficient cooking and heating solutions	**Country Engagement and Pipeline Development** • **Initial Engagement (up to ~$0.5m/country; about 4-6/yr)** based on indicative demand. • **Pilot and project preparation (~$2-3m/country; 2-3/yr);** FY17 demand: Laos, Indonesia, India, LAC, SSA. • **Operational Support** to country teams. • Gender considerations will be an integral part of country activities **Mobilizing Financing and Private Sector Support** • **Monetize clean cooking public good co-benefits in health, climate, and gender** (a) building the results chain from intervention to impact in health, climate, and livelihoods for women; (b) developing a results-based funding mechanism to use public funding to leverage private investment**.** • **IFC-led engagements** – initially focusing on consumer finance and distribution opportunities; with focus on manufacturing to follow. • **Special focus topic** could include LPG Barrier removal, supply chain efficiency, and subsidy reform • **Other innovative approaches** to catalyze development of low emissions cooking**.** E.g. competition(s) aimed at accelerating the development and use of advanced fuels and cleaner stoves as well as environments aimed at reducing exposure to HAP. **Knowledge, Communications and Engagement Across Sectors** • **Global knowledge products and knowledge exchange –** cross-sectoral and cross-country learning, solutions, communications, publications, engagement in international forums. • Incorporating **behavior change** and **gender-informed** lessons to country operations.	• Development Financing Informed – 4 cooking heating country program operations or activities developed in the lending portfolio. • Innovative Approaches and Solutions Generated – 4 new approaches developed and tested. • Policy / Strategy Informed – 2 countries or programs with new or with updated enabling and regulatory frameworks. • Improve equity of male and female participation across the value chain – 2 operations with this explicit approach. • Private sector engagement – 3 enterprises that are "new entrants" in a specific country or market segment.	• Development Financing Informed – 6 cooking heating country program operations or activities developed in the lending portfolio. • Innovative Approaches and Solutions Generated – 6 new approaches developed and tested. • Policy / Strategy Informed – 4 countries or programs with new or with updated enabling and regulatory frameworks. • Improve equity of male and female participation across the value chain – 4 operations with this explicit approach. • Private sector engagement – 4 enterprises that are "new entrants" in a specific country or market segment.
Budget	Based on regional priorities, the country support funds would be distributed as follows: AFR $12-20M ; EAP $4-7; ECA $2-3; LCR $2-3; SAR $5-7	$25m	$40m

SUB-SAHARAN AFRICA 2016-20: ACCES III (50% OF TOTAL SUPPORT)

Key Objectives:
(i) Promote the enterprise-driven, large-scale adoption of clean cooking solutions across SSA
(ii) Develop replicable and scalable blueprints for future WBG clean cooking operations

WORK STREAMS	#1) FUEL SUBSTITUTION	#2) BASE-OF-THE-PYRAMID DISTRIBUTION
Rationale	Building fuel supply and distribution infrastructure for the substitution of traditional biomass	Building and scaling enterprise-driven business models for stove distribution in Africa's largest refugee camps and urban slums
Key Beneficiaries	Urban and rural populations	Populations of refugee camps and urban slums
Transformative Technologies/Fuels/Business Models	Ethanol, LPG, pellet fuels	Pay-as-you-go, mobile payments, tailored product bundles.

Partnerships and Implementation

ECCH program is a collaboration among Energy, Environment, Health, Gender, Climate Change, and IFC.

Partners

- Global Alliance for Clean Cooking (GACC)
- Energising Development (EnDev)
- Governments and Country-based Private, Social And Community Organizations
- International private sector and specialist organizations (e.g. competition managers, LPG) for strategic focus areas

Implementation

- Mix of Bank-executed and Recipient-executed
- Internal WBG partnerships across sectors
- Topic focal points to connect external expertise to regional teams working on country engagements (e.g. new behavior change knowledge developed under GACC program)
- Funding through AFREA and ASTAE programs

Risks/Success Factors

RISKS	MITIGATION
Not all innovative approaches will be successful	Innovations based on sound assessment and country context; unsuccessful approaches will be analyzed to generate “lessons learned”
Creating space in crowded country lending pipelines	Sufficient grant (ESMAP) funds to build strong initial engagement country demand; multi-sectoral approach to CMUs; leverage new sources of co-financing
Response from private sector (technology and business model innovation) is slower than expected	Specific activities in country programs and centrally led targeted at catalyzing private sector innovation
Lack of sufficient funding for pilots in large countries (may exceed ECCH funds)	Actively seek co-funding from non-ESMAP sources

Sustainable Energy for All Technical Assistance Program

SUMMARY

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Problem Statement

Achieving universal access by 2030 will require a step change in the rate of new connections and in levels of investment, particularly in low access countries. Sector-wide programs in the electricity sector are showing better results than what can be achieved using a project-by-project approach. These programs are based on national electricity access roll out plans using geospatial planning and least-cost combinations of coordinated grid and off-grid electrification. The geospatially determined plan in turn anchors the sector investment financing prospectus.

The World Bank Group's Independent Evaluation Group (IEG), has also validated this approach and recommended that a greater use of such an approach would provide the scale and speed necessary to achieve universal access by 2030 in low access countries.

Proposed Response

Building on the learnings provided by the first phase of the S-TAP facility, together with the latest Independent Evaluation Group recommendations to the World Bank Group, ESMAP proposes to expand such initiative in 7 additional countries. The second phase of S-TAP will continue to focus primarily on low access countries to provide them with the required tools to define and implement a long term, sector wide approach to mobilize investments and achieve universal access by 2030.

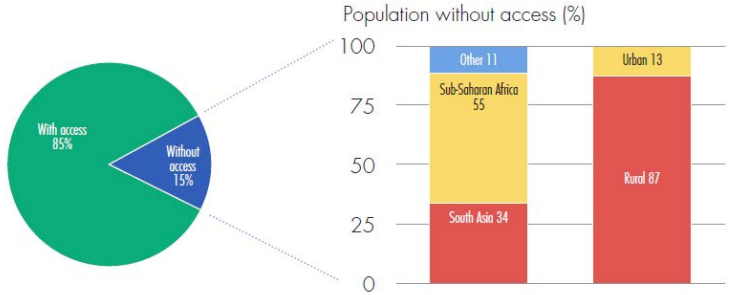
In addition, based on the demand received during the first phase, S-TAP will also include an allocation for just-in-time support to countries that need specific improvements and complements to their existing geo-spatial plans (e.g., integrating off-grid electrification etc.)

STRATEGIC CONTEXT

Despite improvements since the launch of the SE4All initiative:

1.1 billion people still lack access to electricity

Reduction of 0.1 billion largely driven by improvements in India / Highest deficit in SSA countries where electrification rates remain similar to population growth rates



Source: World Bank Global Electrification database 2015 (World Bank 2015).

2.9 billion people still lack access to clean cooking

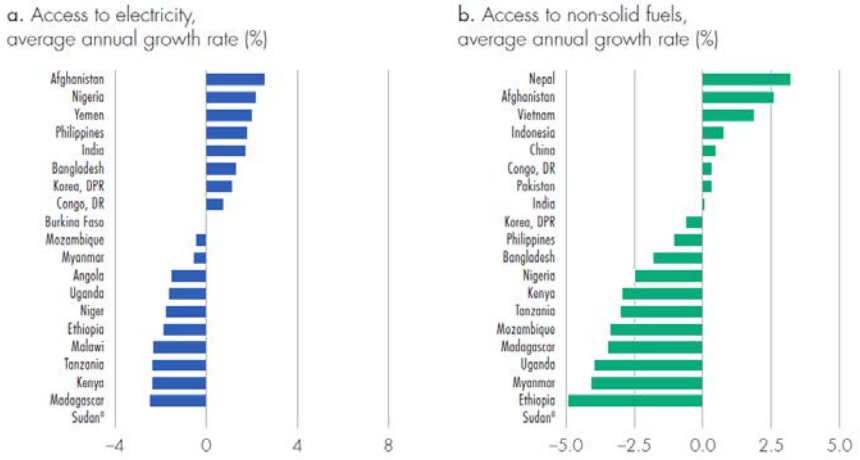
Global clean cooking access deficit barely evolved and remain concentrated in rural areas of Sub-Saharan Africa and developing Asia

Source: WHO Household Energy database 2015 (WHO 2015).

Private Sector

STAP will leverage private sector investments through:

- Development of investment prospectus, which will identify both public and private sources of funding for the proposed investments
- Supporting off-grid electrification investments, by giving potential investors more certainty about the future grid roll-out (through helping Governments develop a least-cost geo-spatial grid roll out plans



In order to reach universal energy access by 2030, access to both electricity and non-solid fuels will need to increase at an accelerated speed, especially in countries with highest access deficits

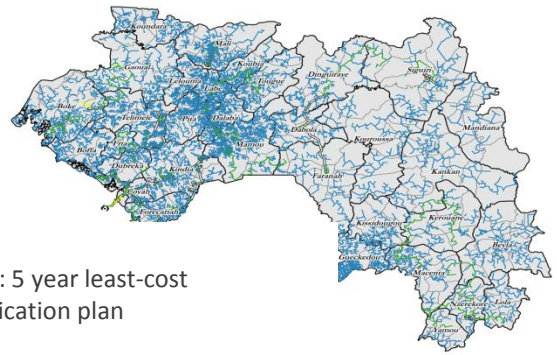
Strategic Context

The Independent Evaluation Group (IEG) recently provided the World Bank Group with 4 main recommendations towards achieving SE4All access target.

1. Engage decisively and intensely on countries with low electricity access (most of which are in Sub-Saharan Africa)
2. Move from a predominantly project-by-project approach—which lacks the scale and speed to achieve universal access by 2030 in low-access countries—to a far greater use of a sector-wide organizing framework and process for mainstreaming the sustained engagement needed for implementing rapid access scale-up
3. Design an engagement strategy to enable low-access countries to mobilize sector-level investment financing on the scale required, and sustained over the next 15 years, 2015–2030
4. Improve the evidence-base related to electricity access and its alignment with the corporate goals of promoting shared prosperity and ending extreme poverty

RESULTS TO DATE

THE APPROACH

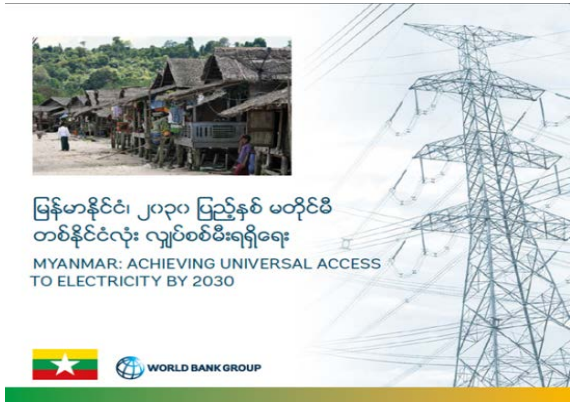


Guinea: 5 year least-cost electrification plan

SE4ALL TA program ($15 M) supports 11 countries and one regional trade initiative to improve planning, develop policy frameworks, strengthen institutions and mobilize financing for energy access

- Promotes sector-wide programmatic approach for energy access
- Sets clear targets
- Uses geo-spatial least-cost methods to optimize investments
- Investment prospectus developed to mobilize funding

THE RESULTS



Work completed in 4 countries , 3 due by June 30, all due by end of CY2016

Emerging outcomes: Coordinated approach, increased domestic and international funding; improved cost-effectiveness through applying least-cost planning, more appropriate technical standards, reduced risk for off-grid investments

Myanmar

- National electrification plan (NEP) for universal access, designed through SE4ALL TA, now being implemented (grid + off-grid)
- Informed IDA operation of $400 M + additional $200 M concessional financing mobilized by NEP

Guinea – Investment prospectus completed; aims to mobilize $550M for a comprehensive grid + off-grid electrification program, supported by a geo-spatial plan

Nigeria – Geospatial planning for two states – Kano, Kaduna helps recently privatized distribution companies plan access expansion and opens a way for off-grid investments; informs a WB access project under preparation

OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20

OBJECTIVES	ACTIVITIES	RESULTS- BASELINE $	RESULTS – STRETCH $
Increase number of low access countries that are enabled to mobilize sector-level financing on the scale required to achieve universal electrification targets.	**Country Selection** ➢ Expansion of S-TAP to additional countries with priority given to high access deficit countries **Sector-Wide Approaches** ➢ Support the definition and implementation of sector-wide approaches, including: ***Geo-spatial mapping and least cost planning*** ➢ Support preparation of geo-referenced least-cost plans, integrating grid expansion with off-grid investment opportunities ***Investment Prospectus (IP) & Resources Mobilization*** ➢ Based on sector wide analysis and recommendations, support countries with resources' identification and mobilization in order to achieve energy access targets (from both development partners and private sector). **Capacity Building & Knowledge Sharing** ➢ Develop in-country capacity towards adequate preparation and implementation of sector wide planning and IP programs. Support to policy makers and energy sector stakeholders towards the creation and strengthening of enabling environments. ➢ Support will includes technical trainings, knowledge sharing, and South-South Knowledge Exchange events and activities **Fill in data/planning gaps** ➢ Provide just-in-time support for complementing existing access roll-out plan with additional data/analysis. This includes updating of existing plans , combining geo-spatial planning with baseline/MTF survey data and filling in data gaps, in particular integration of off-grid electrification options and generation of geo-spatial information helpful for off-grid electrification providers. Using gender data and analysis for improved planning	• 5 countries have been supported in the definition and implementation of energy sector wide approaches and tools. • Investment prospectus and resource mobilization in at least 4 countries have allowed for increased mobilization of public and private investments in the energy sector • Country stakeholders' capacity reinforced • National policy and regulatory frameworks are informed and conducive to energy access rapid expansion • At least 4 existing geo-spatial plans improved • Background note on how gender data and analysis can enhance access planning	• 7 countries have been supported in the definition and implementation of energy sector wide approaches and tools. • Investment prospectus and resource mobilization in at least 4 countries have allowed for increased mobilization of public and private investments in the energy sector • Country stakeholders' capacity reinforced • National policy and regulatory frameworks are informed and conducive to energy access rapid expansion • At least 6 existing geo-spatial plans improved • Background note on how gender data and analysis can enhance access planning
Budget	Tentative Regional Allocation: SSA $6-10M. EAP, LCR, and SAR: $2M	$12 million	$16 million

Partnerships and Implementation

Partners

- SE4ll partners
- Bilateral in a country-by-country basis
- Governments and Country-based Private, Social and Community Organizations
- International private sector stakeholders

Implementation

- Mix of Bank-executed and Recipient-executed
- Led by World Bank country energy teams
- Internal WBG partnerships across sectors
- Emphasis on country level coordination
- Resource mobilization and data activities targeted both at the national and global levels
- Funding through AFREA and ASTAE

Other Development Partners

STAP is a part of SE4ALL drive to support countries in their universal access planning. The selection of the countries, and the mobilization of resources for the resulting investment prospectuses will be closely coordinated with SE4ALL, in particular SE4ALL regional hubs

Risks/Success Factors

RISKS	MITIGATION
Governments' commitment	• Prior government buy-in as a country selection prerequisite • Continued dialogue / engagement
Consensus on sector wide approached and IP conclusions	• In depth government and energy sector stakeholders' consultation towards defining sector wide approaches and IP
Donors and Private Sector investments' mobilization	• Extensive consultation with private sector and pro-active engagement of development partners through the sector wide approach definition and IP design stages
Global coordination and outreach	• Key pillar of ESMAP SE4All engagement and dialogue • Increased communication and outreach on S-TAP at the global level

Global Facility on Mini-grids

SUMMARY

6

Problem Statement

Mini-grids are expected to play a critical role in meeting the Sustainable Energy for All goal of universal energy access by 2030. In the past, proliferation or acceptance of mini grids as a credible energy access option was constrained by a number of factors: gaps in policies and regulations, a lack of long-term financing, and a lack of capacity or interest among power producers. More recently, technological and institutional innovations, and cost reductions have made them an attractive alternative. However, a lack of knowledge and exposure to global best practices continues to create policy and commercial barriers that hold back the expansion of sustainable mini-grids.

Proposed Response

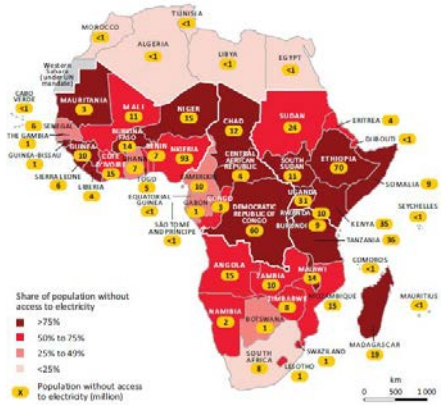
In response, ESMAP initiated a Global Facility for Mini-grids to accelerate the pace of electrification to large groups of people by upscaling least-cost mini grids in World Bank Group operations as well as develop the knowledge associated to achieve this. While mini grids have a long history and are widely used around the world, they are now emerging as a viable option for meeting the energy demand in Sub-Saharan Africa and South and East Asia. Mini-grids are the expected least-cost option for more than 120,000 villages and towns in these regions. The initiative is part of the joint effort on the SE4All High Impact Opportunity on Mini-grids.

STRATEGIC CONTEXT

DEMAND

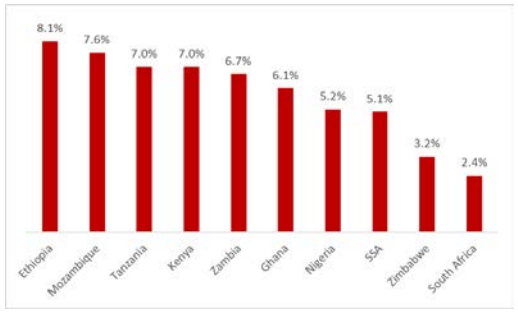
1.2 billion people without access to electricity

Share of population without access to electricity in Africa



Source: OECD/IEA, WEO 2014 Africa Energy Outlook

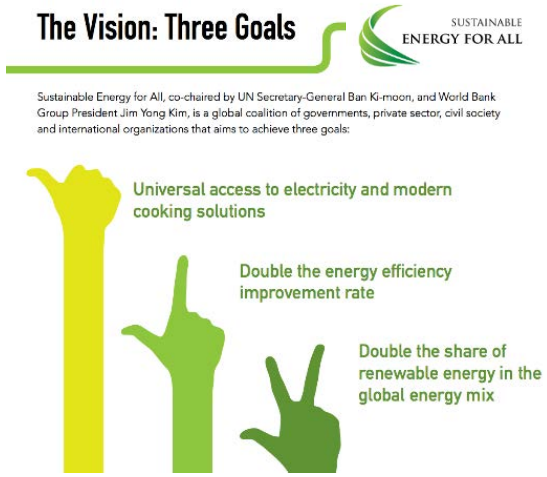
Forecast Average GDP Growth for Select SSA Countries (2015f-2019f)



Source: IMF World Economic Outlook, 2015

GLOBAL AGENDA

Focus on energy access and high impact opportunity mini grids



SE4ALL High Impact Opportunity

Clean Energy Mini-grids

Objective 1

Support the integration of CEMG in national and international policy

Objective 2

Increase interaction and co-ordination between relevant stakeholders

Objective 3

Agreement and knowledge of key concepts, techniques, technologies and approaches

Objective 4

Develop and test business models, with effective monitoring and evaluation of outcomes

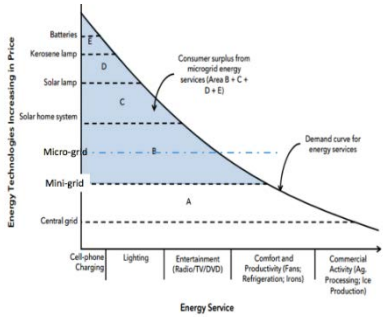
Objective 5

Increase visibility and recognition amongst financiers

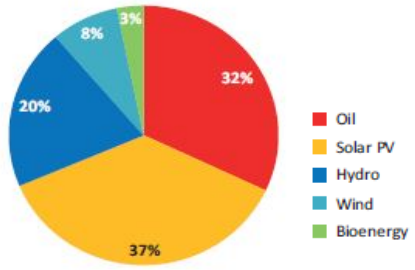
Strategic Context

Mini-Grids are the Least Cost Energy Solution for est. 120,000 settlements

Willingness to Pay & Consumer Surplus in Electrification



Technology mix for 26 TWh min-grid generation in SSA by 2040



Source: OECD/IEA, WEO 2014 Africa Energy Outlook

Partnerships

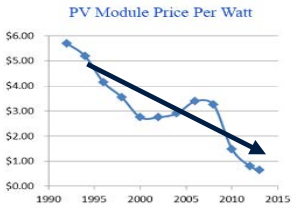
Working with co-leaders in the field

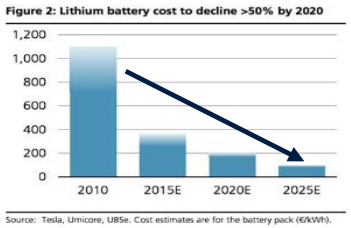
UKaid · Sustainable Energy for All · United Nations Foundation · DANIDA · UNEP · iea · giz · African Development Bank · U.S. Department of Energy · The Rockefeller Foundation

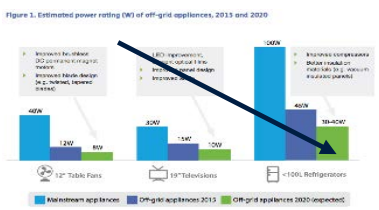
ESMAP facilitates global and client country CONVERGENCE of Enabling Environment and Delivery Mechanisms

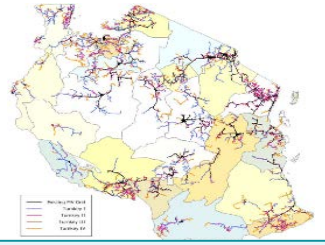
Better planning tools; standardized regulations; access to longer term financing; lower cost energy systems & appliances; upscale training; community based approaches; integration of productive uses & gender; pilot lessons; and an emergence of US$1 billion global micro grid industry

Cost of Generation (US$) + **Cost of Storage (US$)** + **Cost of Appliances (US$)** + **Geo-spatial Planning Tools** + **Global Project Experiences** + **Micro Grid Industry Emerging in High Income Countries**









Reducing the risk for private sector investments through pre-investment support; standardized regulations; and, access to longer term financing

ESMAP Energy Sector Management Assistance Program

ACCOMPLISHED TO DATE

Status Clean Energy Mini Grid

- Annual Learning Event in March 2015
- World Bank Group Mini Grid Affinity Group meeting (2)
- Mini Grid Newsletter with UN Foundation and SE4All
- First round of internal WB Africa Energy proposals – Ghana, Gabon, Mali, and Liberia
- Establishment of advisory group for expert input on external call for proposals
- Collaboration with AfDB, DFID UK, and DFID-country offices
- Coordination under SE4ALL HIO Mini Grid with UN Foundation, UNEP, GIZ/ENDEV, Rockefeller Foundation; as well as IEA, DOE

Success Factors

- Strong demand for electricity and a least-cost solution for large number of settlements
- Committed key staff to lead and coordinate
- Existence of internal and external partnerships
- Mini-grids are a long-standing power system having kick-started power supply in many nations
- Proven innovations in client countries of key building blocks for mini-grid sector growth
- Training institutions available for key building blocks
- Focus to reduce the investment and operational risk for private partners as service providers of electricity

Initial World Bank Group Pipeline

Country	Project Name	Implementing Agency	Systems and Technology
Kenya	Hybrid Mini-Grid Systems	World Bank Group	Hybrid Mini-grid
Mali	Rural Electrification Hybrid Systems	World Bank Group	Hybrid Mini-grid
Tanzania	Renewable Energy for Rural Electrification	World Bank Group	Hybrid Mini-grid/Micro-grids
Liberia	Renewable Energy for Rural Electrification	World Bank Group African Development Bank	Hybrid Mini-grid
Nepal	ABC Business Model	World Bank Group	Hybrid Mini-grid

OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20

OBJECTIVES	ACTIVITIES	RESULTS-BASELINE $	RESULTS-STRETCH $
Increased number of WBG operations with scaled-up, least-cost mini-grids; necessary knowledge based developed	**Pre-investment Activities and Pipeline Development** ➢ Pre-investment activities based on operational and client demand – for example market intelligence (geospatial planning); business plans / (pre-) feasibility study / investment plans; community mobilization / awareness raising; productive load promotions and gender integration; preparation of bid documents; standards designs of equipment ➢ Technical assistance and operational support to project identification and preparation - Pipeline could include new operations in countries such as Rwanda, Ghana, Liberia, Congo DRC, Mali, Myanmar, Nepal and India ➢ Support to supervision of projects under implementation with technical advice to project teams – Pipeline could include operations in Tanzania, Kenya and Mali **Knowledge Development and Dissemination** ➢ Technical assistance program on knowledge management – (i) Business models for upscaling; (ii) Policy (standardized regulations; e-governance; integrated planning); (iii) Finance (commercial; guarantees; performance based; TA etc.) and (iv) Technical (benchmarking; minimum technical specifications etc.) ➢ Case studies – Building lessons from project implementation ➢ Technical notes – Topics to be defined as needs are identified **Outreach, Partnerships, Donor Coordination and Management** ➢ Outreach and partnerships – Mini Grid roundtables, annual meeting, newsletter, sponsoring selected events ➢ Donor coordination – mobilization of additional donor funds for upstream activities, SE4ALL coordination ➢ Management & service team – overall management, technical expertise and on-demand based external specialists	• 3 new World Bank operations informed • 5 countries supported for project identification and preparation • 5 countries provided with technical assistance for project implementation • US$50 million of concessional funds mobilized • 2 global knowledge reports on policy, finance, technical and productive uses & gender of which 1 flagship report • 3 country case studies/technical notes produced • SE4ALL HIO Mini Grid newsletter	• 5 new World Bank operations informed • 7 countries supported for project identification and preparation • 7 countries provided with technical assistance for project implementation • US$70 million of concessional funds mobilized • 3 global knowledge report on policy, finance, technical and productive uses & gender of which 1 flagship report • 5 country case studies/technical notes produced • SE4ALL HIO Mini Grid newsletter
Budget	Indicative Programming Targets AFR: $3-6 million, EAP, SAR, LAC: $1-2 million	Total funding: $ 6 million Carry over funding: $ 4 million New funding request: $ 2 million	Total funding: $ 10 million Carry over funding: $ 4 million New funding request: $ 6 million

Partnerships and Implementation

Partners

- SE4All steering committee partners and the 200 member practitioners
- Specific bilateral partners on a country-by-country basis
- National and local governments, and country-based private, social and community organizations
- International private sector stakeholders

Implementation

- Mix of WB-executed and Recipient-executed
- Led by World Bank country energy teams
- Internal WBG partnerships across sectors
- Emphasis on country level coordination
- Resource mobilization and data activities targeted both at the national and global levels
- With funding for AFREA and ASTAE activities

RISKS/SUCCESS FACTORS

RISKS	MITIGATION
Team experience	Multi disciplinary team complemented by external specialists
Receptiveness of operational task team leaders, practice managers and clients	Dialogues led by experts who have held these positions before
Crowded and overlap of organizations in client countries	Annual meeting, dialogue round tables, joint study tours, country/project specific meetings
Financial resources to meet demand beyond Africa	New business plan proposes global reach
Chosen tactics to work closely with operations	Understanding needs of operations, partnerships with client countries, SE4All, Mini Grid Associations
Convergence of timely cost reduction; improved planning; initial experiences; micro-grids; standardized regulations	Honest broker at key international conferences; allocation of resources

Urban Poor Electricity Access Program

SUMMARY

7

Problem Statement

About 1 billion people live in urban slums and informal settlements. These communities often lack access to legal, safe, and affordable electricity. With rapid urbanization occurring in developing countries and cities expected to house 64 percent of the world's population by 2050, dedicated efforts on urban electricity access are needed to meet the universal access target by 2030.

Proposed Response

In response, ESMAP has launched an Urban Poor Electricity Access Program that seeks to increase or improve access to electricity for the poor in urban/peri-urban/slum areas. The program supports the scale up of interventions through World Bank operations in the energy and urban sectors.

The scale up builds on promising pilots supported during the initial phase of the program and aims to:

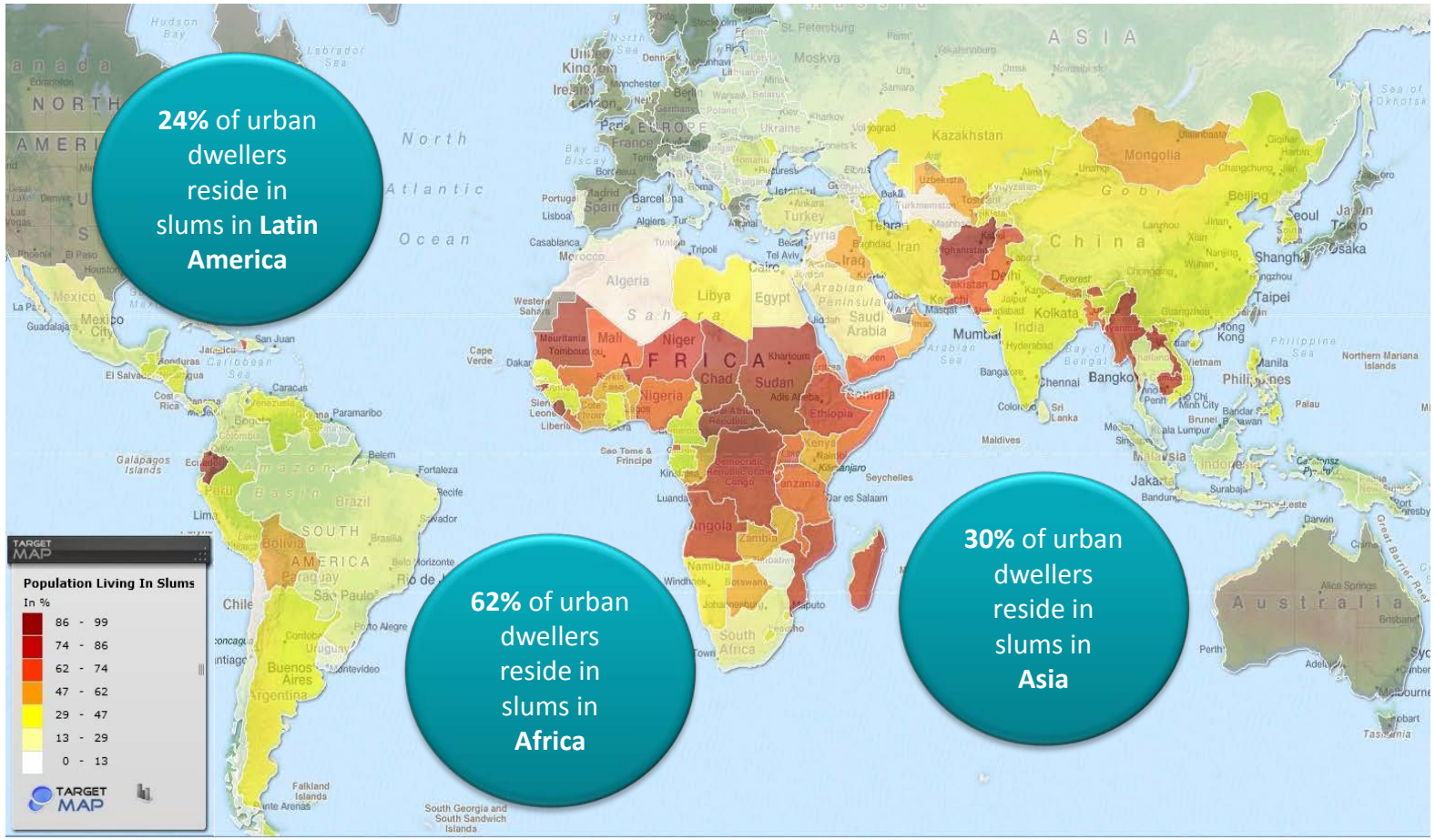
- Continue to provide assistance to programs with good results to allow for further acceleration, for example in Kenya
- Scale-up south-south exchange activities
- Document key elements and seek to standardize approaches where possible
- Inform task teams to scale up financing through WBG lending, Utilities and Governments, and other development partners

STRATEGIC CONTEXT

863 million people
live in urban slums, informal settlements with poor or no access to electricity

2 billion people
are projected to live in urban slums, informal settlements
by 2030

a significant challenge for achieving the SE4ALL universal access goal



Strategic Context

The rapid urban population increase will widen the deficit in safe, legal, and reliable access to electricity in urban areas of countries with already low to medium electricity access rate

- India: has a current urban energy access rate of 79% - and will have an additional 404 million people in urban areas by 2050
- Nigeria: has a current urban energy access rate of 56% - and will have an additional 212 million people in urban areas by 2050
- DR Congo (16%), Ethiopia (27%), Tanzania (15%), Bangladesh (60%) – and will add more than 50 million each to their urban population

Dedicated initiatives are required to address specific barriers facing the urban poor

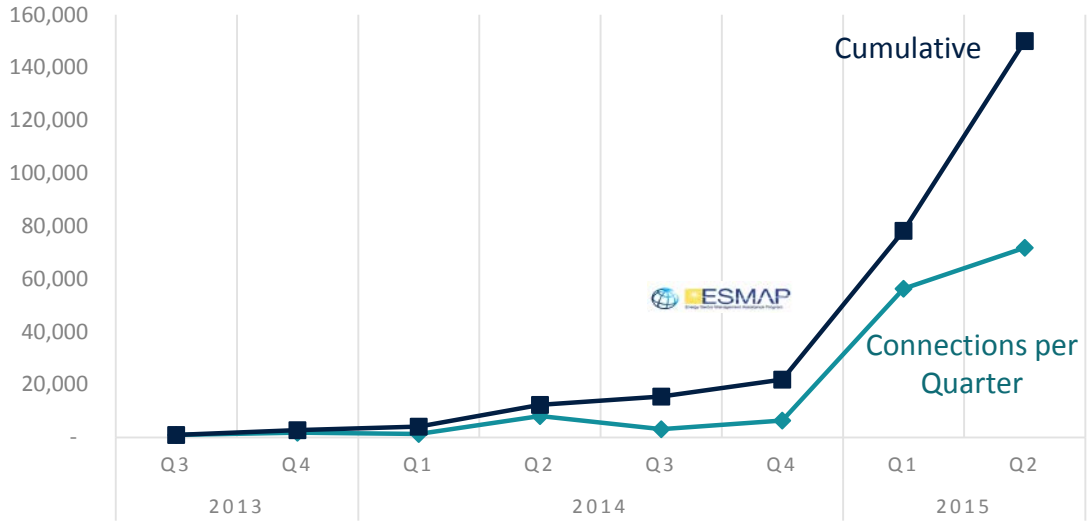
- Dwellers: lack of required documentation for connection, high upfront costs, lack of trust
- Utilities: lack of knowledge on integrating slum electrification in access programs, perception of risks
- Gov't: lack of incentives to provide adequate services
- Gender: lack of active involvement of women and children

ESMAP has the ability to directly engage World Bank Group operational task teams and client countries in policy and lending dialogue. ESMAP is well positioned to facilitate south-south knowledge exchange between stakeholders from client countries from around the world. ESMAP is comfortable to work across sectors, in particular urban and energy, within the World Bank Group and its development partners (for example, Cities Alliance and UN Habitat).

ACCOMPLISHED TO DATE

Kenya – From 5,000 to more than 100,000 connections in one year

- Kenya Power has gone from 5,000 households connected in slum areas, to over 100,000 in just one year. After years of struggle, Kenya's national utility found a way to bring electricity to the country's poorest neighborhoods. At the end of January 2014, ESMAP and WB/GPOBA discussed with KPLC to engage the community in a more proactive way. KPLC hired social scientists to assist in the dialogue with the slum community. A south-south knowledge exchange was held in Nairobi with the assistance of ESMAP, GPOBA and WB after which KLPLC strengthened their community engagement under in the program. The connectivity numbers started to improve. In January 2015, KPLC's top management bought into the program, involving the highest offices in the local governments and the political establishment. The combined efforts led to a unprecedented boom in new connections.



Jamaica

- The program enabled the power utility (JPS), an urban development agency (JSIF), and the regulator (OUR) to learn from successful slum electrification approaches from Chile and India/Delhi. **As a consequence, JPS (power utility) and JSIF (urban development agency) adopted a new perspective in regularizing illegal electricity connections. They entered into a public-private partnership, under which a dedicated regularization team was established and social interventions, inspired from TPDDL's initiatives, have been included.**

Haiti

- The program supported a study to improve access to street lighting in low-income neighborhoods in Port-au-Prince which led to **country and World Bank's commitment to implement an energy efficient street lighting improvement pilot**.

OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20

OBJECTIVES	ACTIVITIES	RESULTS- BASELINE $	RESULTS – STRETCH $
Increased number of WBG operations where electricity access for the urban poor is mainstreamed	**Expanding Operational Support Component** ➢ Support World Bank electricity access projects, as well as slums upgrading, municipal service improvement projects ➢ Expand the scope of the beneficiaries (currently slums/informal settlements) to include the poor in formal urban areas and empower women participation ➢ Continue to provide south-south exchanges as part of the operational support package **Scale-up Knowledge Component** ➢ Generation of lessons learned briefs, and the development of urban poor access expansion plans ➢ Set up and deploy a roster of experts to inform the design of activities ➢ Continue the development of short "how-to" guidance notes	• 2 new WB energy access projects supported • 2 projects with expanded scope of beneficiaries • 2 South-South exchanges conducted • 2 lessons learned briefs developed and disseminated • Database/roster of experts developed and available for global use • 2 "how-to" guidance notes on what… developed and operationalized	• 5 new WB energy access projects supported • 3 projects with expanded scope of beneficiaries • 5 South-South exchanges conducted • 3 lessons learned briefs developed and disseminated • Database/roster of experts developed and available for global use • 3 "how-to" guidance notes on what… developed and operationalized
Budget	Indicative Programming Targets AFR: $1-4 million, EAP, LCR, SAR: $1-2 million	$4 million	$10 million

Partnerships and Implementation

Partners

- Urban and energy sector operational teams
- Client countries
- Utilities
- Specific bilateral partnerships on a country-by-country basis

Implementation

- Focus on country-driven programs
- With some activities implemented by ESMAP
- Internal WBG partnerships across sectors
- With funding for AFREA and ASTAE activities

Risks/Success Factors

RISKS	MITIGATION
No follow up by World Bank operations after the program support	Commitment to implementing follow-on activities supported by the Urban Poor Program will be a key criterion for offering operational support
Weak demand for the program support	Outreach tactics (strategic review of the energy and urban lending portfolio, collaboration with Global Leads, one-on-one TTL outreach) will be implemented
Low implementation/disbursement of the program funding	Adequate human resources and skills will be mobilized to ensure an appropriate pace of implementation
Knowledge products too general	Knowledge products will be developed on a demand basis and will be tailored to country needs Country-specific dissemination activities will be undertaken

ESCALATE

SUMMARY: BRINGING BUSINESS MODELS FOR ENERGY ACCESS TO SCALE

9

Problem Statement

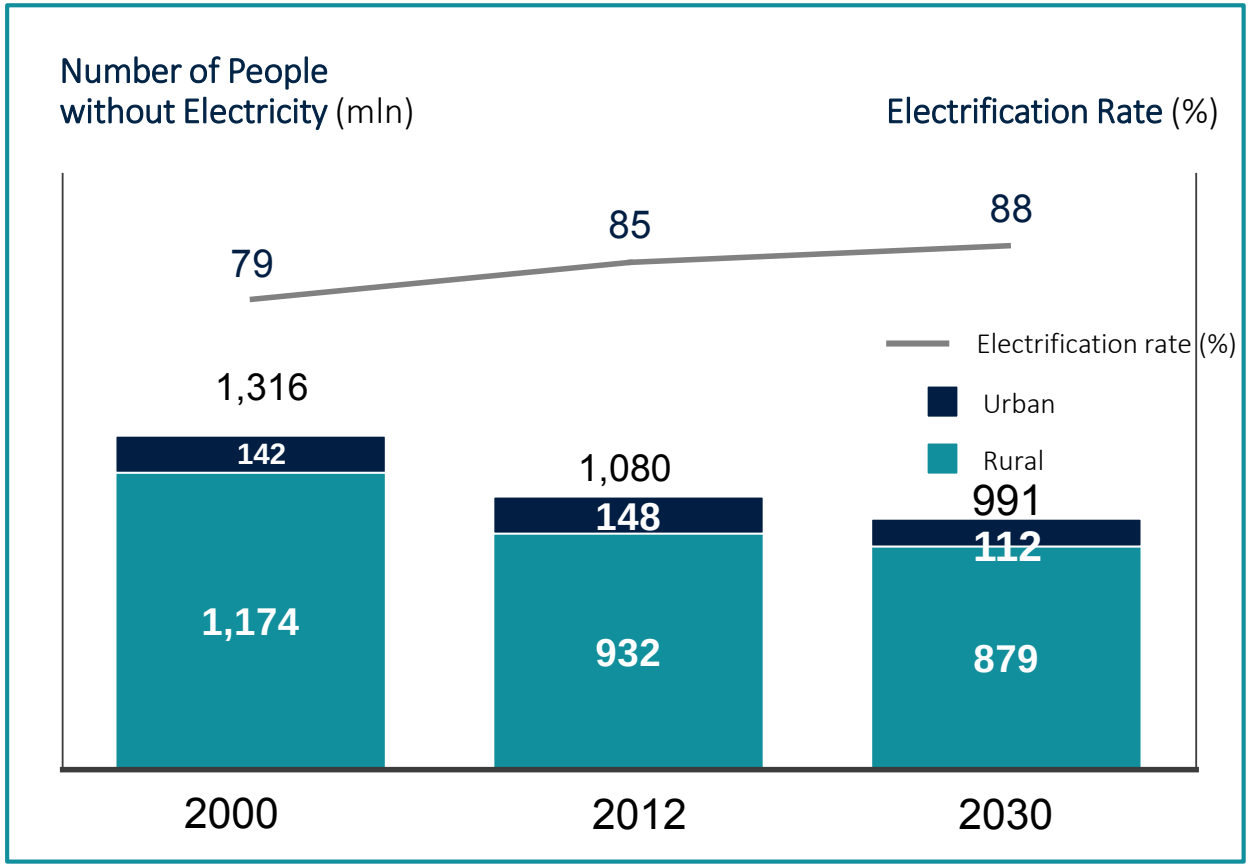
Achieving SE4All target of target of universal access to modern energy services by 2030 will require an accelerated and scaled up engagement of the private sector. Large domestic conglomerates and multinational corporations have both the required operational muscles and investments capabilities to contribute to solving the energy access challenge at scale. While their engagement has so far been relatively limited and largely driven by Corporate Social Responsibility considerations, they are today looking at the provision of energy services to the poor as a commercial opportunity . Despite such opportunity, these efforts remain nascent, sparse and limited by country specific market barriers.

Proposed Response

ESCALATE is a new WBG initiative that aims to engage a number of selected large corporations towards supporting the definition and implementation of innovative energy access Public-Private Partnerships involving large corporates. ESMAP proposes to support such effort towards catalyzing private sector efforts at scale, and further inform countries' private sector engagement strategies within the energy access space.

STRATEGIC CONTEXT

More than 800 million people in rural areas are expected to lack access to electricity in 2030 in a business as usual scenario



- In addition, 2.6 billion people expected to lack access to modern cooking facilities in 2030
- Different assessments project the annual investment required to close the energy access gap by 2030 to be around USD 45 billion/year

The role played by large corporations in emerging markets is currently evolving:

TRADITIONAL

- Grid side – Through classic utility scale engagement
- Lanterns – Through recent CSR initiatives

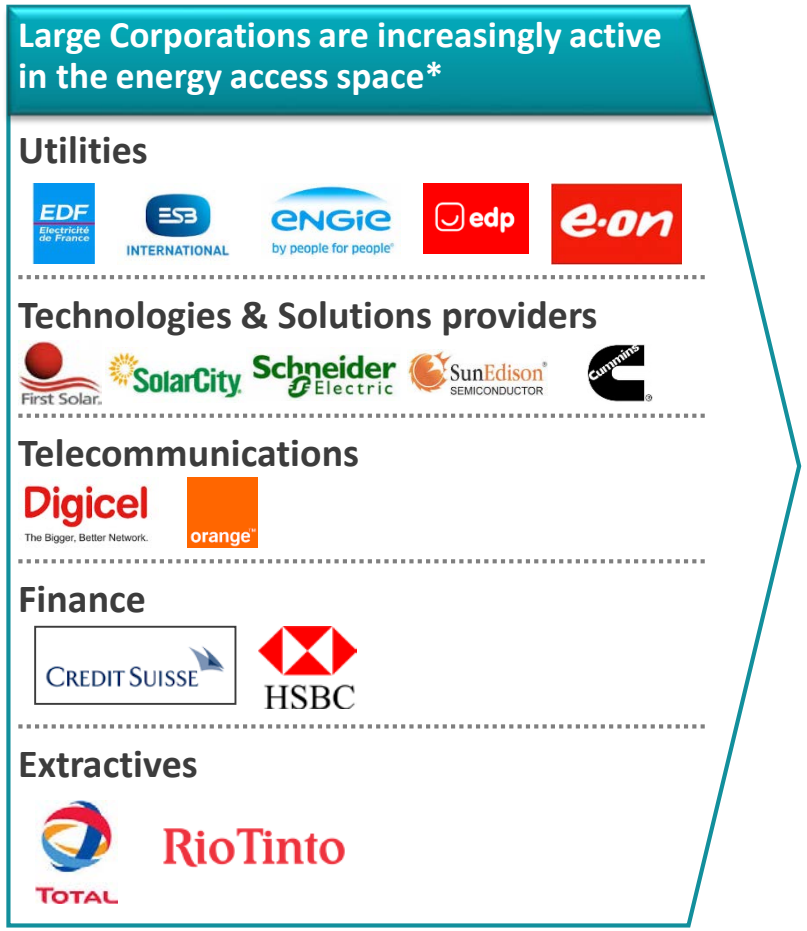
EMERGING

- Off-grid solutions with commercial prospects - with particular interest in mini-grids and solar kits (PAYG models)

Most of the current interest

- Possibly clean cooking solutions – advanced biomass stoves, LPG, ethanol

STRATEGIC CONTEXT



* Companies currently engaged within the ESCALATE initiative

ESMAP's role and comparative advantage

- **Leverage cutting edge knowledge** with the ability to pursue a **specific country-level collaboration**
- **One point of contact** for various WBG collaborations combining policy advice, business advisory and public and private investments

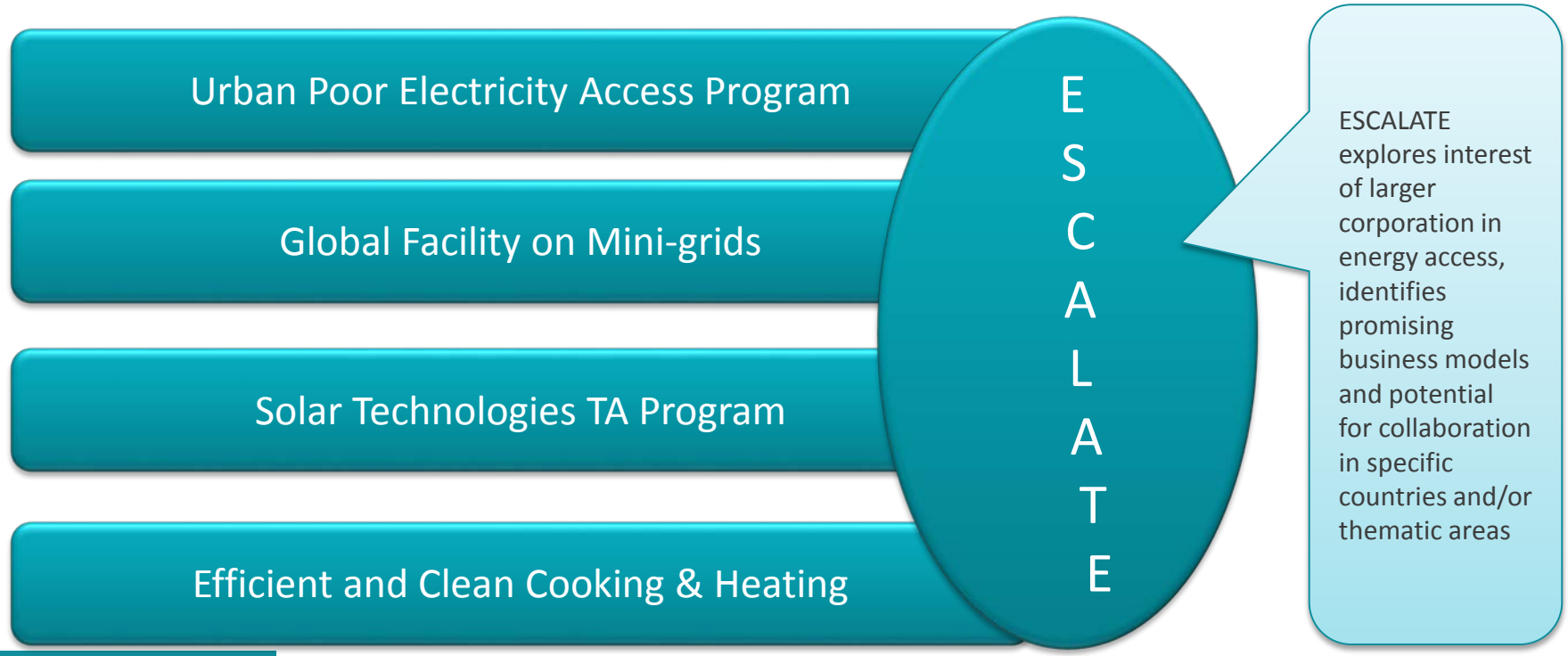
Timing of the WBG / ESMAP engagement acting as a "catalyst" is key and could play a major role

- Some of these Large Corporations (among others) have been interested for a few years as part of their CSR activities but are now increasingly seeing a commercial opportunity in energy access, specially off-grid
- Each of them is currently active with energy access pilot projects on the ground in 1 or more "low-access" countries
- Their global presence, operational robustness, R&D capabilities together with their ability to leverage commercial finance at scale could have a large impact
- The next 1-2 years will be critical as they take decisions to engage at scale or not

STRATEGIC CONTEXT

- ESCALATE focuses on scaling up involvement of larger corporations in energy access, often with interest in several access sub-sectors (e.g. off-grid electricity and cooking). It is the starting point of contact with interested corporations. The aim is to nurture promising business models in coordination with other ESMAP programs and WB/IFC country task teams, which are likely to be leading the actual implementation of resulting collaborations.

ESCALATE's coordination with other ESMAP's access programs



ACCOMPLISHED TO DATE

Coalition Building

- Initiated in May 2015 at the Annual SE4All Forum
- Second session in Paris in October 2015
- 16 large corporates have now joined the initiative
- Coalition remains opens to additional companies, if bringing value and commitment

PPP Preliminary Identification

- Based on companies' interest, market opportunity and potential impact
- 4 countries short-listed for further engagement: Tanzania, Myanmar, Rwanda and Mali
- 3 country framework solutions identified for further engagement: market information and data, skills development and financial innovations
- Possibility to include more countries & interventions

Next Steps

- In-country engagements (Government + private sector players)
- Country framework solutions design
- Business model analytics and market intelligence to support the design of innovative PPP solutions
- Replication in other countries and dissemination of lessons learned

OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20

OBJECTIVES	ACTIVITIES	RESULTS-BASELINE $	RESULTS-STRETCH $
Large corporates' engagement in PPPs catalyzed towards achieving universal energy access target	• **Coalition Building / Stakeholders' Engagement** ➢ Operationalize partnership with key large corporations ➢ Continue engagement with broader spectrum of large corporation on energy access ➢ In-country stakeholders' engagement (governments, local private sector, donors, philanthropists) • **Market Intelligence, BM Analytics & PPP Solutions' Design TA** ➢ Support directly the closure of at least 4 large PPPs ➢ Facilitate and inform design and closure of additional energy access PPPs ➢ Facilitate replication / adaptation of PPP models in other countries • **Knowledge & Capacity Building** ➢ Analyze and make available relevant data on markets, policies and business models, including gender-sensitive designs ➢ Extract and disseminate lessons' learned ➢ Inform governments' policy and regulations reform ➢ Support wider engagement of (new) private sector players	• Coalition of large corporations within the energy access space • Additional large corporations active on energy access • Country level stakeholders' engagements activities held towards the definition of operational partnerships • 2 large PPPs supported through ESCALATE reach closure • 1 country agnostic solution designed and implemented • Dissemination of information and analytics on markets, policies and business models for different markets and customer segments (including examples how gender-sensitive approaches can strengthen business outcomes) • Capturing and dissemination of lessons from private sector engagement and PPP design process captured towards supporting future replication	• Coalition of large corporations within the energy access space • Additional large corporations active on energy access • Country level stakeholders' engagements activities held towards the definition of operational partnerships • 4 large PPPs supported through ESCALATE reach closure • 2 country agnostic solution designed and implemented • Dissemination of information and analytics on markets, policies and business models for different markets and customer segments (including examples how gender-sensitive approaches can strengthen business outcomes) • Capturing and dissemination of lessons from private sector engagement and PPP design process captured towards supporting future replication
Budget		$2 million	$4 million

Partnerships and Implementation

Partners

- Large corporations and domestic conglomerates (energy, ICT, finance, extractives, agriculture, etc.);
- Local SMEs; women's network
- Local and international financial organizations;
- Philanthropists;
- Development partners

Implementation

- Internal WB-IFC reinforced collaboration
- Strong focus on operational partnership
- In-country engagement being prioritized
- Cross-sectoral approach
- Ambition of large scale-up through definition of innovative PPP models
- High scale-up and replication potential in phase 2

RISKS/SUCCESS FACTORS

RISKS	LEVEL	MITIGATION
Private Sector Commitment	Moderate	• Pre-selection of large corporations included in the initiative based of commitment and value add • Continuous check on commitment
Governments' Interest	Low	• Early engagement with client countries • Operationalization phase to be launched based on government clear commitment
PPP design and closure	High	• Allocation of sufficient resources to support sound PPP design • Capacity building provided to client governments to assess options and inform negotiations
Size of deals / impact	High	• Screening of opportunities to be pursued based on expected scale and impact

Global Geothermal Development Plan

SUMMARY

9

Problem Statement

- Geothermal energy is an underutilized resource with the potential to deliver renewable and reliable electricity and heat for many low- and middle-income countries

- Geothermal energy development suffers from a market failure which results in very slow growth of the sector: it is difficult to mobilize commercial capital to validate the viability of geothermal resources through drilling. This unavoidable step often requires US$15-25 million per field, representing around 15% of the capital expenditure in any new utility-scale geothermal project for electricity supply to be spent upfront, with high uncertainty of return.

Proposed Response

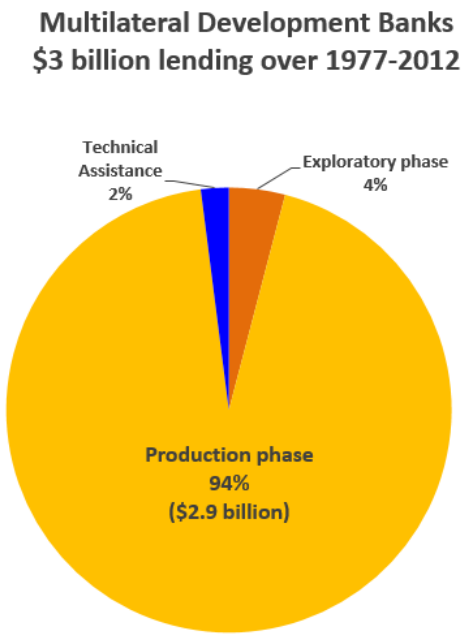
- Mobilize substantial new concessional financing for the risky and capital intensive upstream phases of geothermal development to catalyze investment in all other stages of the geothermal value chain, in low- and middle-income countries

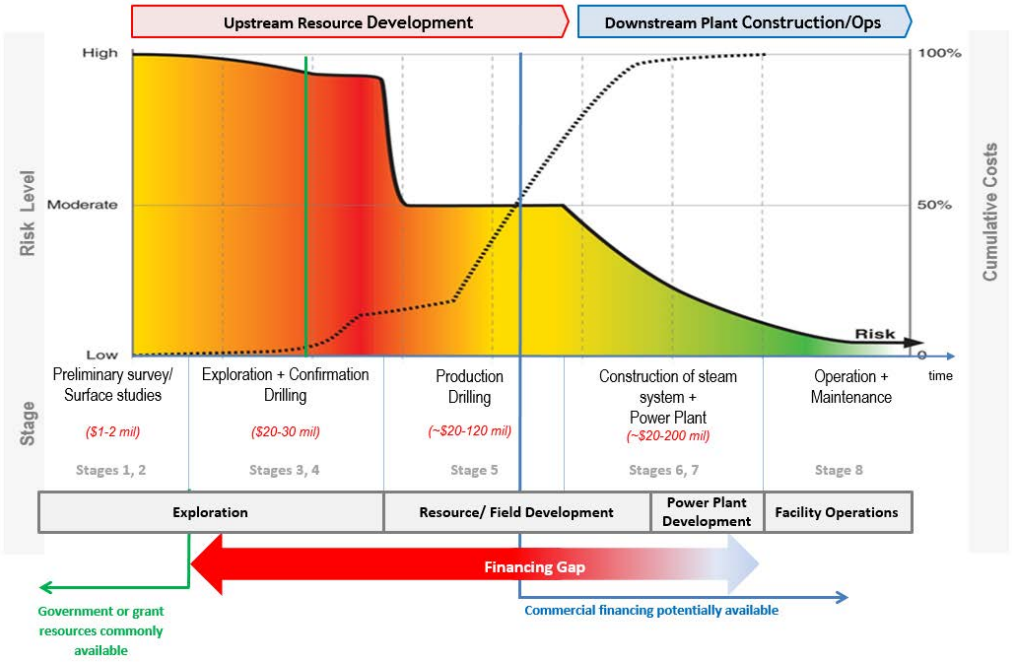
- Support investment project pipeline development in order to enhance the quality and reduce the preparation time for geothermal resource confirmation projects and programs that are good candidates to receive concessional resources.

STRATEGIC CONTEXT

- Geothermal energy has potential to deliver renewable and dispatchable electricity and heat for many low- and middle-income countries
- Development of geothermal energy has been slow: only **+13 GW installed globally, in 65 years**
- Main bottleneck: High risk – high cost: Validating the availability of commercially viable resources through drilling often requires US$15-25 million per field, which are fully at risk
- Experience shows that some kind of public support is essential to confirm geothermal resources and accelerate geothermal development by unlocking private sector participation (incl. financing) in the sector
- Slow growth of the sector has also resulted i limited and fragmented knowledge on best practices to design and execute geothermal development investments

- Concessional financing traditionally focused on “above the ground” geothermal infrastructure and had a very limited contribution to exploration (drilling) of resources and confirmation of their commercial viability
- The GGDP is the only global initiative focused on the geothermal exploration phase and is uniquely positioned to convene multi-lateral and bi-lateral donors, as well as other sector representatives





Global Geothermal Development Plan

De-Risking Exploration to Scale-up Geothermal Energy

THE CHALLENGE

- A market failure leading to chronic underinvestment in geothermal exploration and slow growth of global installed geothermal electrical power capacity
- Until 2012, 94% of MDB lending for geothermal development was for post exploration investments

THE RESPONSE

ESMAP — Energy Sector Management Assistance Program

CIF — Climate Investment Funds

$250 million concessional finance raised

Partnerships for Investment / Knowledge Sharing

- Reducing Drilling Risk course (World Geothermal Conf. 2015)
- Definition of Global Standards for Geothermal Resource Classification
- Geothermal Resource Risk Mitigation Mechanisms report
- Greenhouse Gases and Geothermal Utilization guidance note
- GGDP Roundtables

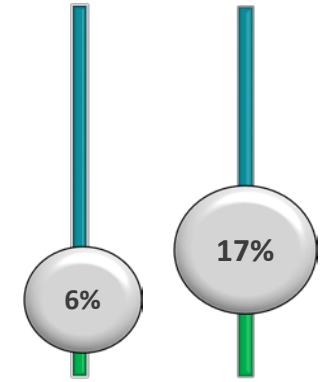
Lending operations and TA to major geothermal developing countries

- Armenia
- Djibouti
- Chile
- Colombia
- Dominica
- Fiji
- Indonesia
- Kenya
- Mexico
- Nicaragua
- St Lucia
- Tanzania
- Turkey

THE RESULT

Global recognition of public funding importance for geothermal exploration

Tripling in share of multilateral financing



Geothermal financing to exploration (% of total for 6 multilateral development banks)

>$1.5 billion public and private capital leveraged

*minimum estimate

OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20

OBJECTIVES	ACTIVITIES	RESULTS-BASELINE $	RESULTS-STRETCH $
Increased investment pipeline for geothermal resource confirmation	**Pipeline Development** ➢ Support to supervision of projects under implementation – Technical advice to project teams ➢ Technical assistance and operational support to project identification and preparation - Pipeline could include new operations in countries such as Kenya, Tanzania, Ethiopia, Philippines, Pacific Islands, Mexico, Chile, Eritrea **Capacity Building and Knowledge Dissemination** ➢ Individual country technical assistance support for geoscientific data management – Regulatory framework, design/implementation of data systems ➢ Case studies – Building lessons from project implementation ➢ Technical notes – Topics to be defined as needs are identified (e.g. direct uses of low temperature geothermal resources) **Donor Coordination and Outreach** ➢ Donor coordination – mobilization of additional donor funds for exploration drilling ➢ Outreach and partnerships – Geothermal Roundtables, sponsoring selected events	• Contribution to sound supervision to 4 ongoing projects • 3 new World Bank operations informed • Best practices paper on geoscientific data management • Needs assessment in 3 countries • 2 geoscientific data management systems informed or designed • 3 case studies/technical notes produced • New round of concessional funds mobilization • Sponsoring of 3 events, including trainings	• Contribution to sound supervision to 6 ongoing projects • 5 new World Bank operations informed • Best practices paper on geoscientific data management • Needs assessment in 5 countries • 3 geoscientific data management systems informed or designed • 5 case studies/technical notes produced • New round of concessional funds mobilization • Sponsoring of 4 events, including trainings
Budget	Regional Allocations: SSA $2-3M, EAP: $1M, ECA: $1M, LCR:$2M	$6 million	$8 million

Partnerships and Implementation

Partners

The GGDP will maintain its strategic collaboration with:

- Climate Investment Funds – CTF
- IFC
- kfW (Geothermal Development Fund for LAC)
- International Geothermal Association

Implementation

- Bank-executed
- Pipeline development and TA for data management: country-driven
- Knowledge products, donor coordination and outreach: ESMAP-driven

Risks & Mitigation

RISKS	MITIGATION
Additional donor commitments for resource confirmation do not materialize	Building on the GGDP's previous experience, continue working on mobilization of additional donor funds, targeting specific funds such as the CIFs and the GCF
Long project development times keep public and private interest in geothermal low	Build up on lessons learnt by defining standardized approaches to project design, contract management, etc. This will be possible thanks to the access to global experiences that ESMAP has through the WBG and other partners.
Limited competition in this small industry can pose challenges to project compliance with procurement rules from IFIs	Analyze and propose procurement practices that are better tailored to the characteristics of the geothermal sector
Inability to rapidly deploy just-in-time specialized consultants can create additional bottlenecks during project identification, preparation and implementation	Expand GGDP roster of specialized consultants to also include firms

Renewable Energy Resource Mapping

SUMMARY

10

Problem Statement

Many developing countries do not have good information on the location, scale, and quality of renewable energy resources. This leads to a number of barriers and market failures, including:

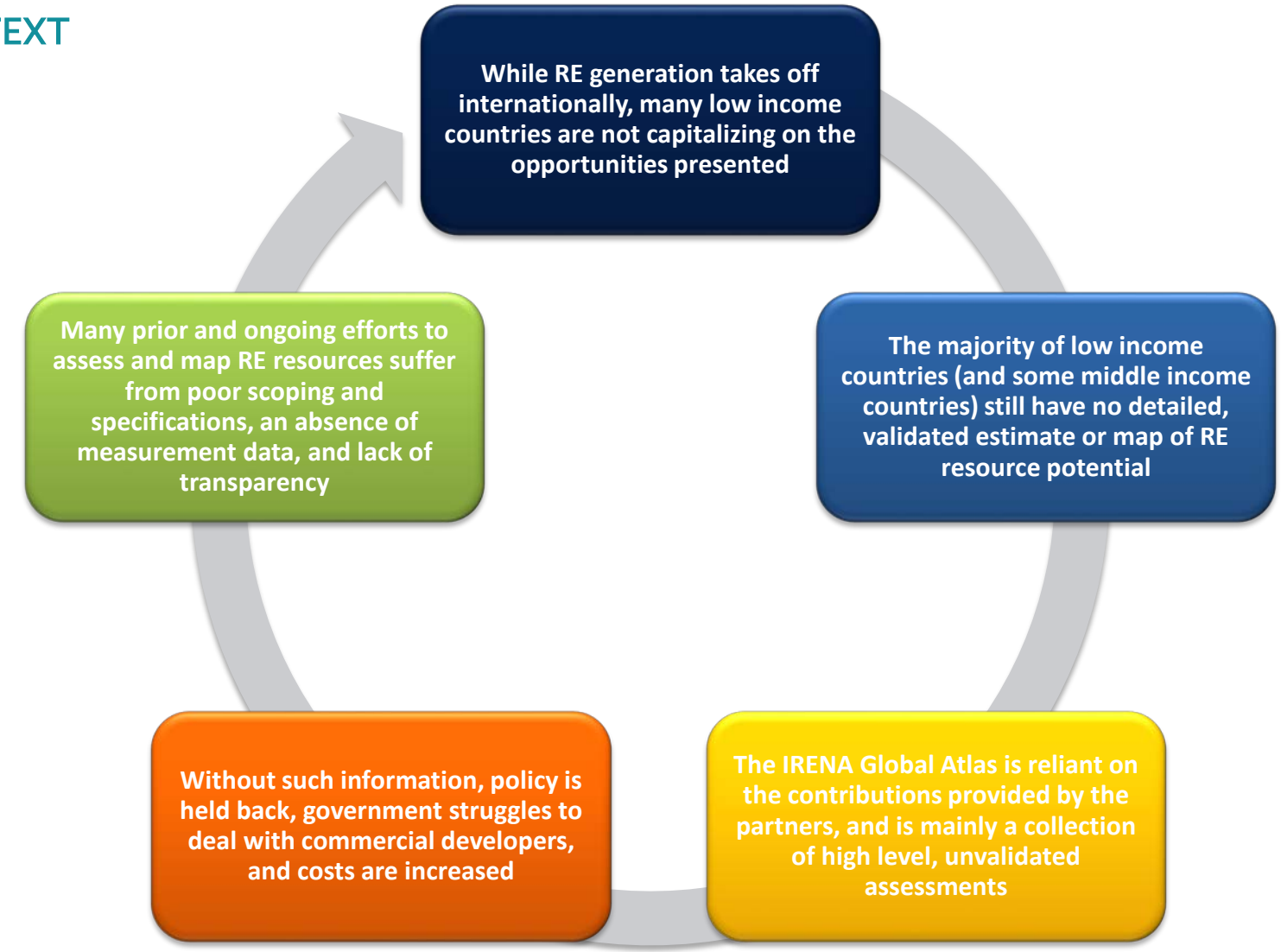
- A lack of information to inform strategic planning, including power system planning, least-cost generation studies, and zoning guidance
- Information asymmetry between the government and commercial developers, leading to higher power purchase costs
- Higher costs to developers in carrying out initial site assessments, creating a barrier to market entry
- Poorly informed communities and land-owners, creating the conditions for potential exploitation on land acquisition
- Increased resource risk due to a lack of long-term reference data, raising the cost of financing

Renewable energy resource assessment and mapping can fill these information gaps, but only when commissioned and executed to the highest international standards with full data transparency.

Proposed Response

Renewable energy resource assessment and mapping, done right, is a crucial pre-requisite to scaling-up clean energy deployment, particularly in countries with low or zero penetration rates. ESMAP proposes to build on the initiative started in 2013, which has been a run-away success, but with a major reconfiguration to achieve much greater impact with less resources. Building on the methodologies and experience gained over the last four years, the team will move to a more 'wholesale' approach to commissioning resource assessment and mapping outputs, but with the same focus on quality and transparency. This will expand the focus from country-level resource assessment and mapping to include global and site-specific outputs, such as a Global Solar Atlas down to time-series data, enabling clients and project teams to get access to data more quickly and at substantially lower cost. Where ground-based validation data is lacking, this will be commissioned across multiple countries, or potentially sourced from developers that are willing to share. Finally, ESMAP will ramp up its outreach and dissemination, in partnership with IRENA, to ensure the greatest benefit from the range of global public goods that will be generated.

Strategic Context

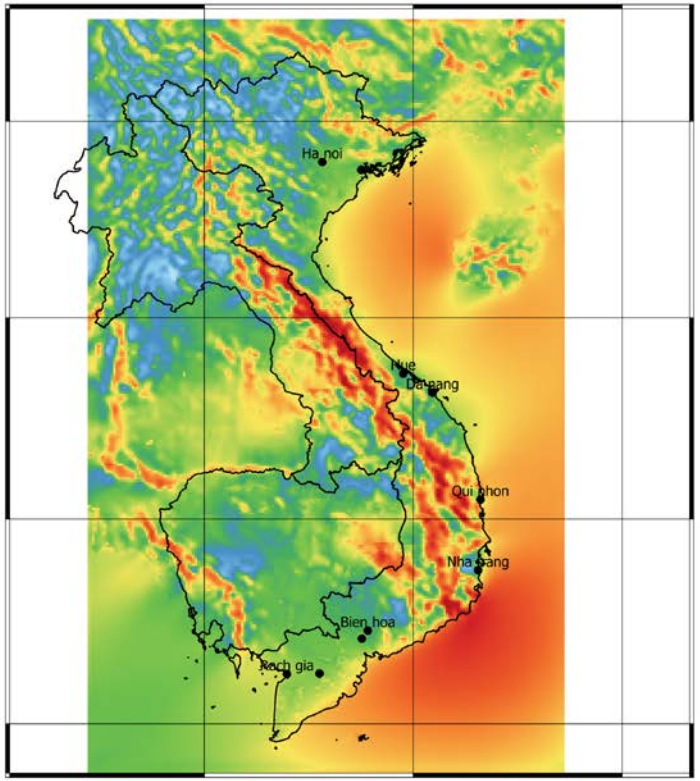


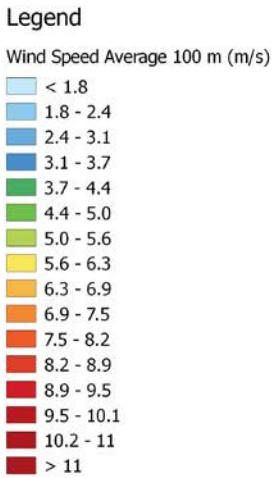
Current Status

- ESMAP initiative on Renewable Energy Resource Mapping & Assessment launched in 2013
- Projects in 12 countries comprising 20 mapping assignments – table shows assignments with ticks
- High levels of client engagement
- Major focus on procurement, specifications and 'open data'
- 87% implementation rate (committed or disbursed)
- Solar and wind measurements (Phase 2) have started in four countries and will continue for two years
- Five assignments to be completed by end of FY17
- Partnerships:
  - AECID: coordination on solar mapping in Vietnam plus hosting of their data
  - EU: collaborating on solar and wind mapping in Zanzibar, plus data sharing
  - GIZ: utilizing and publishing their wind measurement data in Vietnam
  - IRENA: using the Global Atlas to publish GIS outputs
  - NREL: coordination to avoid duplication, and discussion over standards

COUNTRY	BIOMASS	SMALL HYDRO	SOLAR	WIND
Ethiopia				✓
Indonesia		✓		
Lesotho (IFC)				✓
Madagascar		✓		
Malawi			✓	
Maldives			✓	✓
Nepal				✓
Pakistan	✓		✓	✓
Papua New Guinea				✓
Tanzania		✓	✓	✓
Vietnam	✓	✓		✓
Zambia			✓	✓

Accomplishments to Date





Two Examples…

Wind mapping in Vietnam

- Existing development (and wind measurements) focused on coastal areas
- Low level jets discovered in center of country, plus potential resource in the north
- ESMAP-funded project will open up large new areas for private sector development

Small hydro mapping in Tanzania

- Shows 70+ promising sites, identified from earth observation analysis and site visits
- Many sites were unknown to Rural Energy Agency
- Next stage will carry out pre-feasibility on high priority sites, which can then be taken on by private developers under ongoing TEDAP operation

LESSONS LEARNED

What Worked

- ✓ Positioning ESMAP as a center of excellence in this area has allowed much greater reach than through funded projects alone
- ✓ A hub-and-spoke approach to program management has reduced the burden on TTLs and has ensured high standards
- ✓ Working with a pre-selected group of vendors allows for good technical discussions
- ✓ Vendor pool needs to be broad and fluid to allow for country restrictions, vendor changes, and innovation
- ✓ Emphasis on open data from the start has kept clients on board and pleased developers
- ✓ Training is best when focused on understanding the data collected and how it can be used

What Did Not Work

- × The approach adopted requires significant resources and has high transaction costs
- × Decision to procure all services under one contract is too inflexible
- × Preparation for Phase 2 measurement campaign is a common source of delays
- × Clients have not so far been pro-active in carrying out geospatial analysis and follow-on work

MEETING GROWING DEMAND

Huge Unmet Needs

- Strong interest from over 20 low income countries and from commercial developers
- Unmet demand within existing pipeline
- New demands for site-specific data for investment projects
- Data needed to inform other work, including on VRE

ESMAP's Comparative Advantage

- Global presence and energy sector donor lead in many countries
- Increasingly recognized as a center of excellence
- Strong links to wider WBG energy work, including investment operations
- Excellent collaboration with international development partners
- Specifications and standards designed to be 'bankable', facilitating their use by commercial developers

Major Reconfiguration Proposed

- Modeling and mapping to be split from measurement campaigns
- Smart use of procurement to obtain a series of global outputs, such as a Global Solar Atlas and solar/wind maps for every country in the world – available to the public
- Continuation of country-based biomass and small hydro studies in high priority cases
- Provide on-demand access to high quality solar and wind data for WBG project teams and clients

OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20

OBJECTIVES	ACTIVITIES	RESULTS-BASELINE $	RESULTS-STRETCH $
Increased number of countries with validated maps of renewable energy resources at sufficient scale and quality to support policy planning and commercial development. *This will support:* • Strategic planning by governments and utility companies • Improved policy design, tariff setting, and negotiations • Site identification and pre-feasibility by commercial developers • Better informed communities, mitigating the risk of land grabs and exploitation • Reduction in resource risk, lowering the cost of financing	**Country and Regional Projects** ➢ New framework contracts to provide validated solar and wind maps, and on-demand access to more detailed data for clients and WBG project teams ➢ Commission gap-filling measurement program in Sub-Saharan Africa, and in other regions if funds permit ➢ Support high priority country-based biomass and small hydro mapping projects ➢ Support client-requested geospatial planning work that includes environmental, social and gender considerations **Global Support and Expertise** ➢ Provide one-stop-shop for WBG project teams on solar and wind ➢ Provide advice to client and development partners on RE mapping projects outside WBG ➢ Improve data accessibility through open data tools, working with IRENA ➢ Explore urban/rooftop and transmission grid mapping **Coordination and Outreach** ➢ Fundraising at the global and country level to leverage ESMAP funds ➢ Major efforts to increase visibility and reach ➢ Outreach to in-country partners to avoid duplication	**Outputs** • Provide a Global Solar Atlas and a Global Mesoscale Wind Atlas • Provide solar and wind mapping outputs for all low-income countries • Obtain data from >25 solar measuring stations and >25 wind masts • Commission at least three small hydro and/or biomass country studies **Outcomes** • Convert >20 outputs into WBG operations or follow-on work • >5 external projects informed/supported • Target of >$15m in additional funding leveraged	**Outputs** • Provide a Global Solar Atlas and a Global Mesoscale Wind Atlas • Provide solar and wind mapping outputs for all WB client countries • Obtain data from >50 solar measuring stations and >50 wind masts • Commission at least five small hydro and/or biomass country studies **Outcomes** • Convert >30 outputs into WBG operations or follow-on work • >8 external projects informed/supported • Target of >$24m in additional funding leveraged
Budget	Strong focus on low income countries in funding allocations: SSA: $6-12M, EAP: $4-7M, LCR: $1-5M, SAR: $4-7M	$15 million	$24 million

Partnerships and Implementation

Partners

- **Global vendor network**: pushing the boundaries through competitive bidding
- **IRENA**: on Global Atlas
- **NREL**: coordination, plus standards and visualization
- **WMO**: peer review of outputs plus discussions on long-term equipment ownership
- **Bilaterals** on a country-by-country basis

Implementation

- Bank-executed activities using ESMAP funding, including through AFREA and ASTAE programs
- Demand-driven through internal calls for proposals and through links with project teams
- Increase the number of client-executed activities with ESMAP inputs
- Strategic use of procurement to drive innovation
- Leverage corporate data/GIS resources

RISKS/SUCCESS FACTORS

RISKS	MITIGATION
Difficult to raise substantial funding for perceived 'high cost' technical assistance activities	'Reconfiguration' on solar and wind will reduce costs; build RE mapping needs into investment plans; engage widely with clients and donors
Data hosting and visualization platforms offered by partners do not fully satisfy our needs	Invest in improving and developing low-cost WBG solutions (building on corporate services); concerted outward engagement with partners
Client countries do not integrate analysis into their policy development and guidance	Projects selected according to country demand; in-country partner engagement to identify hooks for follow-up work
Measurement campaigns partially or fully fail, or equipment is not maintained after project closes	Compulsory use of local partners for measurement campaigns, and international and national outreach to identify future equipment owners

Variable Renewable Energy Grid Integration Support Program

SUMMARY

11

Problem Statement

Having a sizeable share of Variable renewable generation (VRE) serving the electricity demand is challenging for power system operators. In weak electricity networks, evacuating power from locations with good solar or wind resources is often an issue, and, if not properly specified, VRE generation can aggravate voltage instability or frequency problems in absence of enough flexible operating reserves able to ramp up and meet demand when VRE are not available. The potential need for grid investments and operational changes raises concerns for planners and operators. In addition, VRE distributed generation disrupts the traditional utility business model, and may lead to distribution grid overloading. Finally, excessive VRE curtailment due to technical and economic grid integration issues is also hindering investment in new projects and limiting resource utilization in several countries.

Proposed Response

In response, ESMAP has developed the VRE Grid Integration Support Program to offer support to utilities, operators, regulators and other public organizations. The program will cover capacity development for long-term grid planning, market design, revision of VRE support mechanisms, development of rules of access to electricity grids for VRE, and efforts aimed at strengthening the electricity dispatch and transmission infrastructure. ESMAP proposes a programmatic and scalable initiative that involves a combination of in-house expertise as well as deployment of external technical experts and organizations to provide technical assistance and capacity building to assist on the transformation of power systems.

STRATEGIC CONTEXT (I)

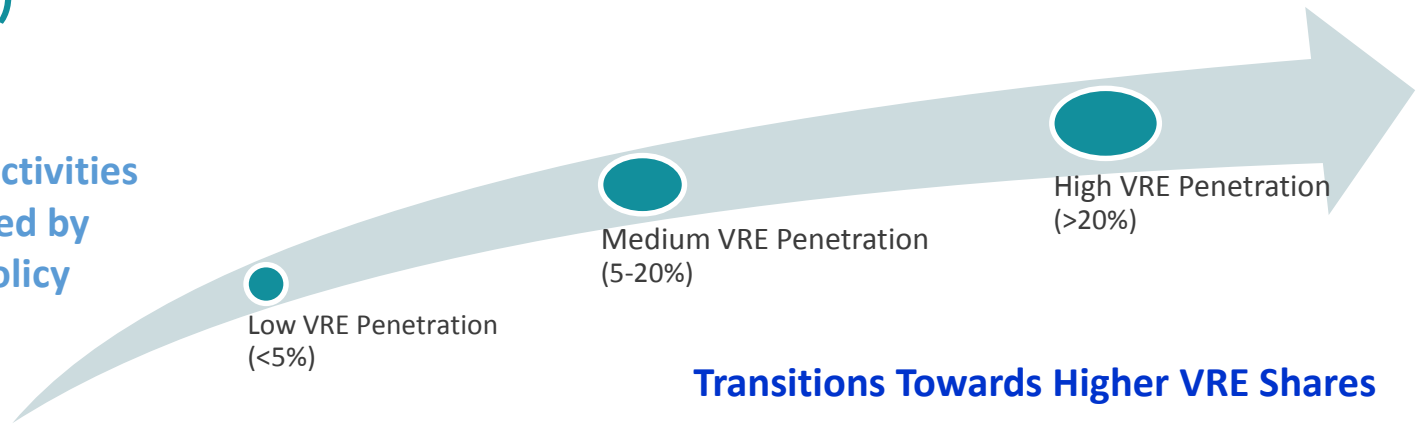
- Large Price drops for wind and solar electricity generation offer developing countries significant opportunities to develop a cleaner and more secure energy mix.
- Variable Renewable Energy (VRE) grid integration is being identified as central to enable utility-scale renewable scale-up as well as the expansion of VRE distributed generation. Early analysis, planning and preparation can significantly reduce costs and improve outcomes of integration, but this is a relatively new and complex area for client countries.
- Research, international collaboration and knowledge exchange on VRE Integration has significantly increased over the last years. Several international organizations and donors are active in this field. The **International Energy Agency (IEA)** has studied the potential barriers for high levels of VRE in many countries under the GIVAR project and the Task 25. The Us based **"Utility Variable-Generation Integration Group" (UVIG)** aims at accelerating the development and application of good engineering and operational practices supporting the integration of VRE among utilities. Clean Energy Ministerial (CEM) has created the 21st Century Power Partnership (21CPP), a multilateral collaborative platform to foster public-private collaboration for the large-scale deployment of RE, energy efficiency and smart grid solutions among the 23 member countries. The "Greening the Grid ask an expert service" offers policy advice. The operating agent for the 21CPP is the National Renewable Energy Laboratory (NREL) in the United States. NREL is also working on integration studies in several countries, with funding from 21CPP and **USAID** (under the Low Emission Development Strategies (EC-LEDS) program). Other Bilateral donors, such as **GIZ and DANIDA** are supporting several countries in regulatory and technical integration studies.
- Despite existing efforts, many of these programs don't cover all the client needs, are too focused on specific technologies, or don't take into account all the stakeholders involved in the power sector, making difficult to reach agreement on the way forward. Moreover, the recommendations of the technical studies may not be implemented due to lack of funding.

ESMAP Comparative advantage:

- ESMAP has the ability to directly inform World Bank policy dialogue and lending operations. Together with World Bank regional teams the program will develop the analytical work necessary to structure sound Bank operations and investment environments to catalyze private participation in a coordination with IFC and MIGA.
- ESMAP has a multidisciplinary team with experience in managing global knowledge programs in clean energy and well positioned to facilitate Knowledge events and South-South Knowledge Exchanges that are becoming key to broadening options, accelerating reforms and strengthening local ownership. ESMAP is well positioned to fill the knowledge gap and ensure that not only utilities, but also governments, planners, and regulators are included in the VRE integration dialogue.
- ESMAP has a unique convening power within the broader clean energy eco-system where many actors are increasingly starting to focus on challenges related to VRE penetration and grid integration. Donor coordination of efforts is essential to provide clear advice adapted to the special circumstances in each country.

STRATEGIC CONTEXT(II)

Several areas of intervention and activities have been identified by researchers and policy makers



Transitions Towards Higher VRE Shares

	Low VRE Penetration (<5%)	Medium VRE Penetration (5-20%)	High VRE Penetration (>20%)
Operational Support	• Control systems • Data collection • Evaluate power system condition & performance	• VRE Forecasting • Interconnections • VRE dispatching centers • Impact on existing generators	• Additional Flexibility • VRE dispatching centers • Optimize forecasting & scheduling intervals
Regulatory Framework Incentives & Markets	• Grid codes • Adequate incentives • Evaluate impact of VRE markets design	• Optimize incentives • VRE forecasting mandates • Market design for flexibility and adequacy	• Evaluate effectiveness of incentives and markets • Locational pricing
Planning Generation, T&D, Nexus with Other Sectors	• Grid absorption studies • Short term planning: balancing • Long term planning: adequacy	• Review planning • Impact of distributed generation on utilities • Smart-grid roadmap	• Implementation • Monitoring: flexible generation, storage, demand response

STRATEGIC CONTEXT(III)

The program aims at **catalyzing private sector investment** by:

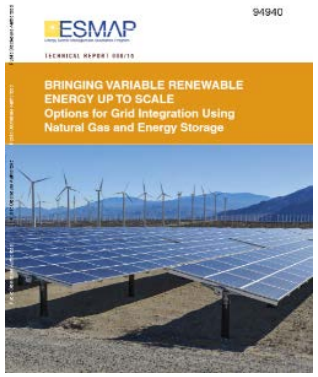
REDUCING PRIVATE INVESTMENT PERCEIVED RISK. ESMAP VRE program aims at contributing to reduce the curtailment of variable renewable generation for technical or financial reasons. Good expansion planning and geographical dispersion of VRE generation will reduce the curtailment risk, private developers will be more willing to invest in VRE projects.

ESTABLISHING AN ENABLING ENVIRONMENT FOR PRIVATE SECTOR DEVELOPMENT: Regulating the access to the grid for private developers and prosumers will help the private sector to have a clear idea of requirements and associated costs, as well as benefits while ensuring the reliability and quality of electricity supply. Grid codes and market rules must be fair at allocating risks and benefits in order to attract scale-up renewables with the involvement of the private sector while ensuring the sustainability of utilities and distributions companies.

BOOSTING END USER INVESTMENTS IN VRE DISTRIBUTED GENERATION: Adequate rules, standards and incentives will allow to maximize the contribution of distributed rooftop PV systems by encouraging small investors, cooperatives and individual end users to install these systems without creating technical or financial problems for utilities and operators.

ACCOMPLISHED TO DATE: VARIABLE RENEWABLE ENERGY GRID INTEGRATION

THE CHALLENGE

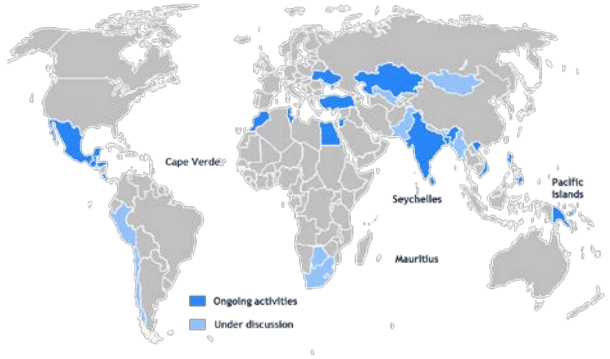


- Large Price drops for wind and solar technologies offer developing countries new opportunities
- Conventional electricity utilities need assistance to upgrade their skills and business practices
- Early analysis, planning and preparation can significantly reduce costs of integration, but this is a relatively new and complex area for client countries.

THE RESPONSE

- Program delivered by leveraging resources through partnerships with Global Sustainable Electricity Partnership (GSEP), the Clean Energy Ministerial (CEM), the National Renewable Energy Laboratories (NREL) and with support from the Korean Green Growth Trust Fund (KGGTF).
- ESMAP team of grid integration specialists established to assist regional TTLs in collaboration with WB planning and policy teams.
- Program provides Just-in-Time Support to client countries to solve immediate VRE challenges and long-term assistance to transform power systems planning, operations and regulatory framework to accommodate higher VRE shares.

THE RESULT



Engagements in 22 countries + 2 regional projects

- **Completed**: Philippines| Transmission and Distribution Grid Code Amendments and presentation in public hearings and Seychelles| Study on LNG and VRE integration completed to provide roadmap for future investment; country considering RAS
- **Ongoing**: Bangladesh, Costa Rica, Guatemala, Haiti, Honduras, India, MENA CSP, Mongolia, Morocco, Pacific Islands, Philippines, Kazakhstan, Seychelles, Sri Lanka, Turkey, Ukraine, Vietnam,
- **Under Discussion**: Botswana, Chile, Myanmar, Pakistan, Peru, South Africa, Uzbekistan

ACCOMPLISHMENTS TO DATE (II)

COUNTRY	ACTIVITY DESCRIPTION
Bangladesh	Support for Planning and grid integration studies. (funded by KGGTF)
Costa Rica	Support to distributed generations (grid code and standards)
Guatemala Honduras	Initial VRE Grid absorption study
	VRE Grid integration study and long term planning (funded by KGGTF)
India	National level study on the impact of VRE and limit of VRE that can be absorbed by the current system. This will complement and feed into the detailed regional analysis performed by NREL with co-financing from USAID
Haiti	VRE economic impact analysis (funded by KGGTF)
Kazakhstan	Review of integration study and market analysis financed by ESMAP ABG grant
Mexico	Workshop on pumped Storage and Integration of VRE and Economic analysis of Storage for VRE integration (under discussion)
Morocco	Initial capacity building and expert assistance to populate and long term planning model. Demand forecasting tools report and procurement of demand forecasting integral solution on-going. Capacity building on VRE dispatching to ONEE Staff (Brussels 2015)
Myanmar	Grid integration study
Philippines	Technical assistance to the support of distributed generation (financed by ESMAP ABG grant)
Seychelles	Short Study on technical and economical feasiblity of LNG regasification+generation plants in combination with VRE in small islands (co-financed by World Bank)
Sri Lanka	Preliminary planning and estimation of grid integration costs
Turkey	Training for TEIAS ant WB HQ of planning for VRE
Ukraine	Review Pump-storage in combination with VRE to enhance Ukrenergo ability of integrating wind power. Review of Power Market design proposal
Vietnam	Solar PV identification and grid integration

These initial engagements are expected to strengthen the dialogue and grow into a more structured support.

PROGRAM SCOPE

CLIENT DEMAND

- In addition to those countries with on-going engagements, additional support will likely be required in all regions.
- The program will balance the allocation among regions, and support regional investment programs, such as the scale-up solar initiative in Africa.
- Focus on countries with weak networks and high VRE targets.

Expected Demand in Countries with On-going WB Engagement Linked to VRE

COUNTRY	ESTIMATED FUNDING NEEDS IN FY17-20								
	Planning for Integration	New Business Models	Operational Support (TSOs, utilities and DISCOs)				Regulatory Support		
	Grid Studies	Role of DISCOSs and Utilities in Distributed Generation	Capacity Building	VRE Forecasting	Control Systems and VRE Dispatching Centers	Infrastructure Investment Preparation	Grid Codes & Standards	Market Design & Regulation	Incentives & Procurement Strategies
Costa Rica	✓	✓	✓				✓	✓	
El Salvador	✓	✓	✓				✓		✓
Guatemala	✓	✓	✓	✓	✓		✓		✓
India	✓	✓	✓	✓	✓	✓	✓	✓	✓
Morocco	✓	✓	✓	✓			✓		
Mexico	✓	✓	✓	✓			✓	✓	✓
Seychelles	✓	✓	✓			✓			
Sri Lanka	✓		✓	✓			✓		
Ukraine			✓	✓	✓	✓		✓	✓
Philippines	✓		✓	✓		✓			
South Africa	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cabo Verde	✓	✓	✓		✓	✓	✓	✓	✓
Vietnam		✓	✓			✓		✓	✓
Kazakhstan	✓	✓	✓				✓		
Mongolia	✓		✓			✓			✓
Myanmar	✓		✓			✓	✓		✓
Pakistan	✓	✓	✓		✓	✓	✓		✓
Sri Lanka	✓	✓	✓	✓			✓	✓	✓

OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20

OBJECTIVE	ACTIVITIES	RESULTS-BASELINE $	RESULTS-STRETCH $
Increased number of countries with strengthened grids to integrate increased share of variable renewable energy	**Country and Regional Projects** ➢ VRE Grid integration studies and long term integrated expansion plans including impact of VRE ➢ Operational support to utilities, operators and distribution companies. Project identification and support to procurement of VRE dispatch systems, control, communication and energy storage and other "smart-grid" technologies, including VRE metering and forecasting ➢ Support utilities to define and implement new business models in preparation for higher levels distributed generation Regulation and procedures VRE grid codes and standards.; Alignment of VRE support mechanisms with Planning Strategies. ➢ Electricity Market design Support to design of new markets if markets pose a barrier to VRE	**Outputs** • Provide VRE grid integration studies for at least 7 countries/regions. • Provide operational/ procurement/ business technical assistance to at least 7 utilities. • At least 5 grid codes reports/regulatory TAs delivered to Clients. At least 2 Electricity Market Design supported	**Outputs** • Provide VRE grid integration studies for at least 10 countries/regions. • Provide operational/ procurement/ business technical assistance to at least 10 utilities. • At least 7 grid codes reports/ regulatory TA delivered to Clients. At least 3 Electricity Market Design supported
	Global Support and Expertise ➢ Organizing/financing short trainings and donor coordination workshops ➢ Revision of studies, regulations and terms of reference ➢ Performing rapid needs assessments ➢ Local grid stability impact studies of upcoming VRE plants ➢ Engagement with GSEP, NREL and other partners to develop new knowledge products ➢ Technical notes/livewires – Topics to be defined as needs are identified (e.g. storage technologies applications for developing countries)	➢ At least 7 training events/ workshops organized / facilitated for Clients ➢ At least 5 rapid needs assessments completed ➢ Guidelines for procurement of VRE integration enabling technologies ➢ 5 Livewires/ technical note	➢ At least 10 training events/ workshops organized / facilitated for Clients ➢ At least 7 rapid needs assessments completed ➢ Guidelines for procurement of VRE integration enabling technologies ➢ 7 livewires/technical notes
	Coordination and Outreach ➢ Fundraising at the global and country level to leverage ESMAP funds ➢ Partner coordination to avoid duplication of work ➢ Collaboration with "ask an expert" service by Clean Energy Ministerial	➢ Target of >$5m in additional funding leveraged ➢ At least 3 engagements with "Ask and expert", KGGTF and other donors facilitated	➢ Target of >$10m in additional funding leveraged ➢ At least 5 engagements with "Ask and expert," KGGTF and other donors facilitated
		Outcomes ➢ At least 5 new World Bank operations informed ➢ At least 2 external projects informed/ supported ➢ At least 7 country Planning Strategies informed ➢ At least 5 Country Policies informed	**Outcomes** ➢ At least 8 new World Bank operations informed ➢ At least 4 external projects informed/ supported. ➢ At least 10 country Planning Strategies informed ➢ At least 8 Country Policies informed
Budget	Regional Allocations: AFR: $5-6M, EAP: $2-4M, ECA: $1-2M, LCR: $3-5M, MNA: $2-4M, SAR: $2-4M	**$16 million**	**$24 million**

Partnerships and Implementation

The VRE program will ensure adequate consideration of gender aspects in all consultation processes leading to regulatory changes and in the ESIAS of WB lending projects linked to VRE grid integration TA.

Partners

- Clean Energy Ministerial,
- NREL
- Global Sustainable Electricity Partnership
- IRENA
- Korea Green Growth Trust Fund (KGGF) and the SIDS DOCK Support Program
- WB Global solutions group
- World Metrological organizations(WMO)

Implementation

- Bank-executed activities using ESMAP funding
- Demand-driven through internal calls for proposals and engagement with World Bank Task Managers
- Potential client-executed activities for leveraged funds
- Leverage corporate data/GIS resources

Risks/Success Factors

RISKS	MITIGATION
LACK OF DATA. The effectiveness of the support provided by the program depends to a large extent on the availability of and access to power system data. Many client countries lack high quality data collection systems and some stakeholders (such utilities) have shown limited willingness to share available data with external parties in the past.	The team will mitigate this risk by engaging with utilities and securing as much information as possible at scoping stage. Data acquisition will be included as part of the scope and budgeted when necessary.
LACK OF STAKEHOLDER CONSENSUS. Although the economic benefits of improved grid integration can be very large for society at large, perverse incentives could reduce the interest of some influencing stakeholders in the program and political-technical disconnections could result in policies and regulatory frameworks deviating from technically and economically sustainable solutions.	Clear commitment from relevant governmental authorities, utilities and policy makers should be taken into when allocating funds.
LACK OF OWNERSHIP/ IRELEVANT OUTPUTS. Clients not applying the knowledge gained through the assistance, especially in the areas of planning and regulation.	Projects selected according to country demand; in-country partner engagement to identify hooks for follow-up work. The team will supervise closely the activities to ensure the agreement on the scope and approaches.

Solar Technologies Technical Assistance Program

SUMMARY

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Problem Statement

- Despite high cost reductions, especially in PV panels, solar deployment in many developing countries with good solar resources will remain slow, mostly as a result of high financing costs.
- An inadequate enabling environment, limited government capacity for contractual negotiations and efficient procurement of private power generation, and high payment risks associated with weak credit off-takers, slow down development and drive up costs. Increased cost of capital especially affects capital intensive renewable energy (RE) technologies as it can lead to significant increases in levelized costs of electricity.
- In off-grid areas, recent advances in technology and business models open new opportunities for accelerating global progress towards the universal access goal. Financial, policy and capacity barriers are, however, constraining the pace of off-grid electrification. In addition, the progress is unequal across countries and markets.

Proposed Response

- Catalyze increased investments in solar technologies through the creation of an adequate enabling environment for both grid connected and off-grid solar technologies by focusing resources on activities for which there is currently limited support from the WBG and other development partners:
  1. Comprehensive country assessments on status of country's enabling environment for solar technologies and identification of specific areas for WBG, other donors and private sector support.
  2. Feasibility studies and project structuring for grid-connected technologies
  3. Strengthening global enabling environment for solar off-grid markets and catalyzing transformative WBG investments in solar off-grid technologies
- Maximizing synergies with ESMAP RE Mapping and VRE Integration and Mini-Grid Facility
- As an integral part of the forthcoming WBG Global Solar Initiative – WBG Climate Action Plan (inc. Africa Climate Action Plan) and WBG Lighting Global, with continued funding for Lighting Africa

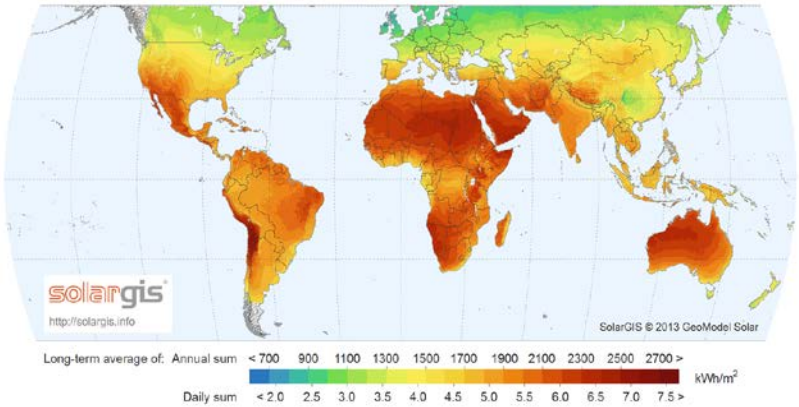
STRATEGIC CONTEXT: GRID-CONNECTED SOLAR

Solar PV is one of the technologies with the highest potential to move markets and reduce GHG emissions.

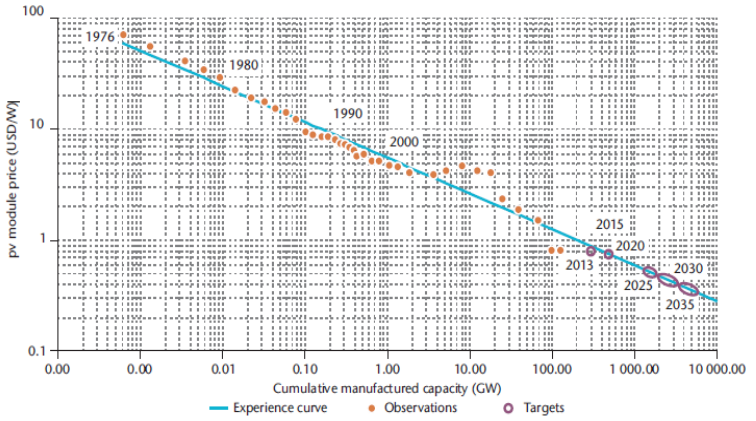
- **Solar PV prices have fallen significantly in recent years** - e.g., 6.95 ¢/kWh; 5.6 ¢/kWh in UAE; 8.7 ¢/kWh in Brazil, 6.5 ¢/kWh in South Africa; 6.1 ¢/kWh in Jordan; 6.5-6.9 ¢/kWh in Chile; 4.8 ¢/kWh in Peru; **80% of global markets to reach grid parity by 2017**
- **Solar power contributes to energy security** by limiting exposure to fossil fuel price volatility and by reducing dependency on high cost fuel-oil based generation*
- **High modularity of solar PV** can be built and operational in short timeframes (6-12 m), deployed under different models (e.g., utility scale, distributed generation-rooftop solar), and pave the way to deployment of distributed storage
- **Solar PV will play an important role in many INDCs**
- Solar PV has been globally recognized as a potential game changer in developing countries if large-scale deployment further drives down costs – **International Solar Alliance (ISA)** announced at COP21 (International Agency for Solar Policy and Applications)

* Fixed and leased fuel-oil plants (i.e., diesel, bunkers, and kerosene) are used extensively in developing countries, notably in SSA, to provide incremental capacity as well as flexibility to national grids that are frequently too dependent on seasonally variable hydropower (MIT, 2015)

- **Solar is the most abundant RE resource in many developing countries**: 100+ countries with high potential



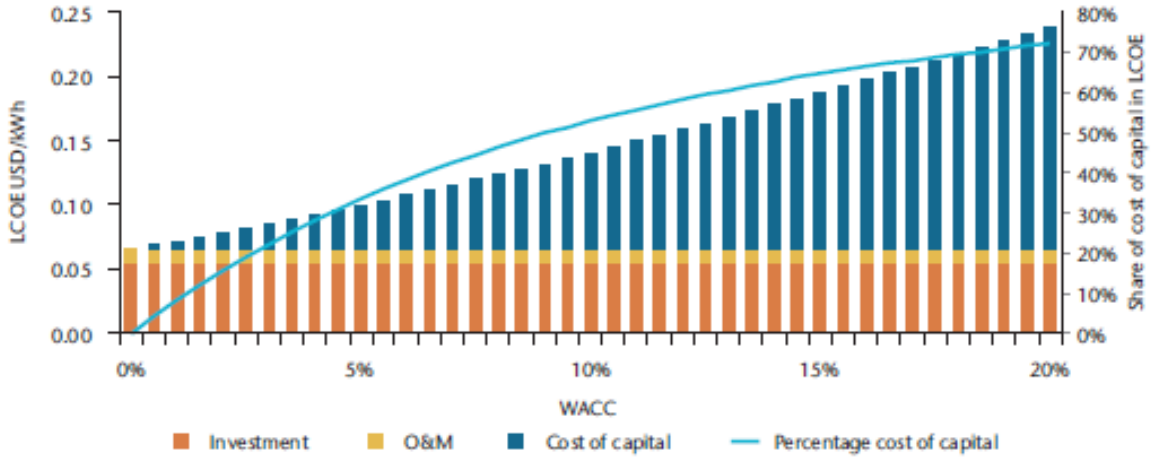
- The cost of PV modules is expected to halve in the next 20 years, with technological innovations to play an important role



STRATEGIC CONTEXT: GRID CONNECTED SOLAR

High costs still hinder deployment of solar PV in many developing countries.

- In many developing countries, the **high cost of capital resulting from an inadequate enabling environment, especially high financing risks**, is the main barrier to solar deployment.
- **Increased capital costs have a significant impact in the LCOE** of CAPEX-intensive renewable energy technologies such as solar
- Higher than average EPC costs have also been observed in several developing countries*, which is likely a result of limited competition



Source: IEA 2014. Technology Roadmap Solar PV

Notes: This example is based on output of 1 360 kWh/kW/y, investment costs of USD 1 500/W, annual operations and maintenance (O&M) of 1% of investment, project lifetime of 20 years, and residual value of 0.

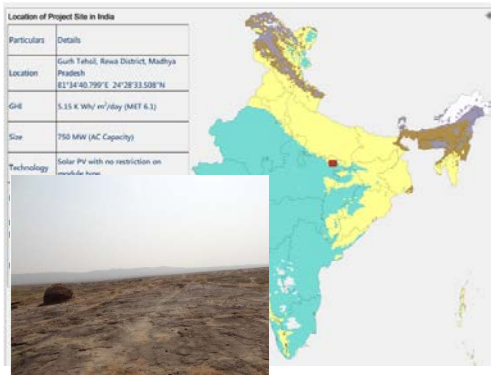
* This is based on anecdotal evidence only, additional analysis is needed to better understand this phenomenon

ACCOMPLISHED TO DATE: INDIA SOLAR PARKS

THE CHALLENGE

- India's power system needs to grow rapidly to fuel its economic growth and provide electricity to its growing population.
- GoI has set an ambitious goal of providing uninterrupted power for all sectors by 2022. Currently, India relies largely on coal, for about 60 percent of its electricity generation requirements.
- The Government of India (GoI) wants a growing share of the country's electricity to come from renewable energy.

THE RESPONSE



- As part of GoI's ambitious goal of installing 100GW of solar power by 2022, MNRE has launched a **Solar Park Scheme** to develop 20 GW of utility scale solar power by 2020.
- Concentrating solar power in one location brings economies of scale, but poses power evacuation and operational challenges.
- ESMAP/ASTAE has provided support to project preparation, financed South-South exchanges with Brazil on renewable energy auctions and grid integration and explored project structuring and climate finance options.

THE RESULT

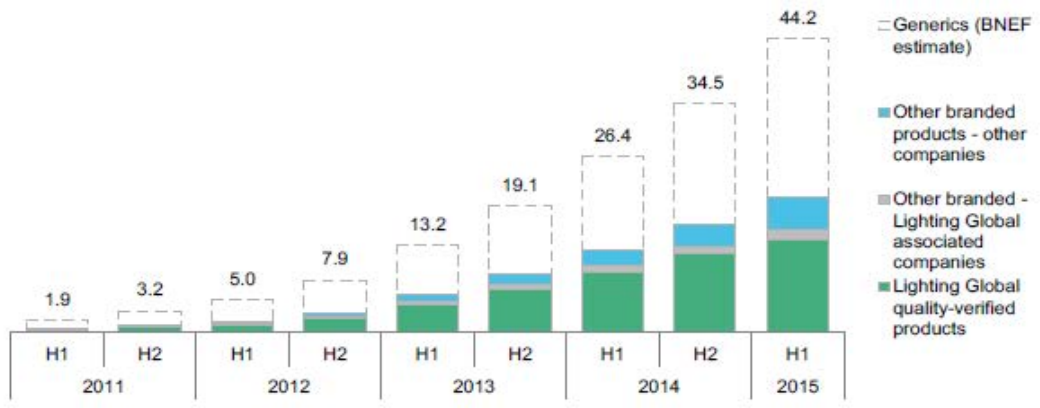
- The WB is preparing a **US$200 million ($150M IBRD, $50M CTF) Shared Infrastructure for Solar Parks Project** and **$300 million ($280M IBRD and $20M CTF) Transmission for Power Evacuation from Solar Parks Project** to support the development of solar parks in the states of Madhya Pradesh, Chhattisgarh, Orissa and Himachal Pradesh.
- This project will also provide support for capacity building of State Nodal Agencies and Joint Ventures (implementing agencies) across the participating States.

STRATEGIC CONTEXT: OFF-GRID SOLAR

Promising developments in off-grid solar markets

- The off-grid solar sector has seen impressive growth in the past 10 years, starting almost literally from zero. Lighting Africa and Lighting Global have been one of the catalysts of this growth (quality assurance of products, support to both Governments and enterprises to build sustainable markets in multiple countries…)
  - 20 million branded pico-solar products sold in the last 5 years, in addition to 44 million unbranded products
  - 100+ companies actively focusing on solar lanterns and solar home kits
  - Increasing variety of products, including bundling with energy efficient TVs, fans, and other appliances
  - Innovative business models such as PAYG are overcoming consumer financing hurdles and are leading the way in East Africa and a few other geographies
  - The sector has attracted more than $511 million of investment to date, with pay-as-you-go companies alone accounting for 1/3 of the amount

Figure 10: Estimated cumulative sales of pico-solar lighting products in sub-Saharan Africa and Asia, 2011 – H1 2015 (millions of units)



* Source: WBG Lighting Global: Off-grid Solar Market Trend Report, 2016

According to Lighting Global latest market trend report, consumers save on average $3.15 for every dollar spent on pico-PV in Africa.

ACCOMPLISHED TO DATE: LIGHTING AFRICA (AFREA)

THE CHALLENGE

- **600 million people in SSA are without access** to modern energy services, especially in rural areas.
- **Better enabling environment needed** to accelerate the development of sustainable markets for affordable, off-grid lighting solutions, e.g.
  - Quality standards
  - Level playing field with kerosene and other inferior lighting alternatives
  - Building private sector capacity

THE RESPONSE

Lighting Africa flagship initiative supports delivery of **modern energy services via off-grid solar solutions**:

1. Development of quality standards & testing of products
2. Support private sector to deliver off-grid lighting services
3. Support government to develop a enabling environment
4. Development & implementation of consumer awareness campaigns

THE RESULT

Adoption, Reach

- Already operating in **12 countries**
- Became **global benchmark** for quality in the pico-PV market
- 10.5 m quality lighting product sold
- Over **19.5 million Africans** benefiting from LA-certified products

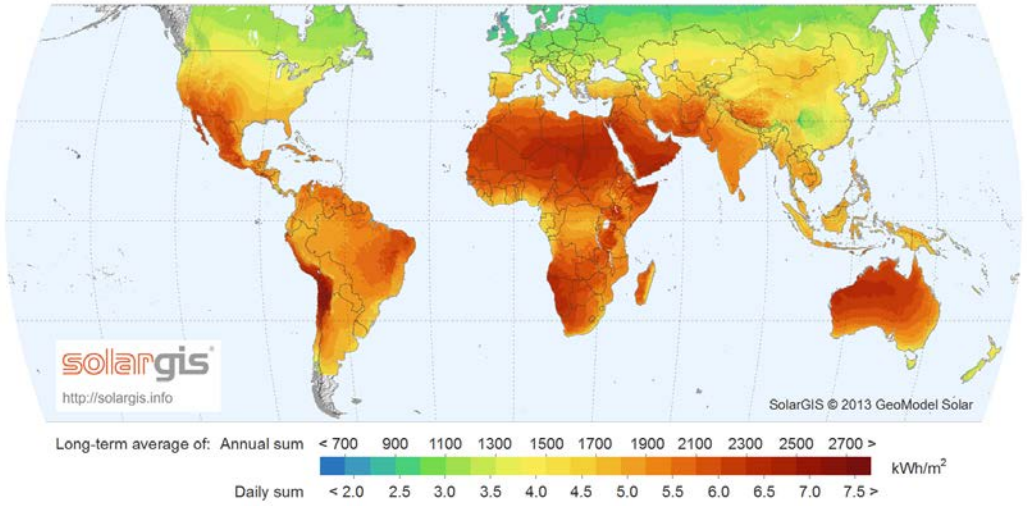
Investment Leverage

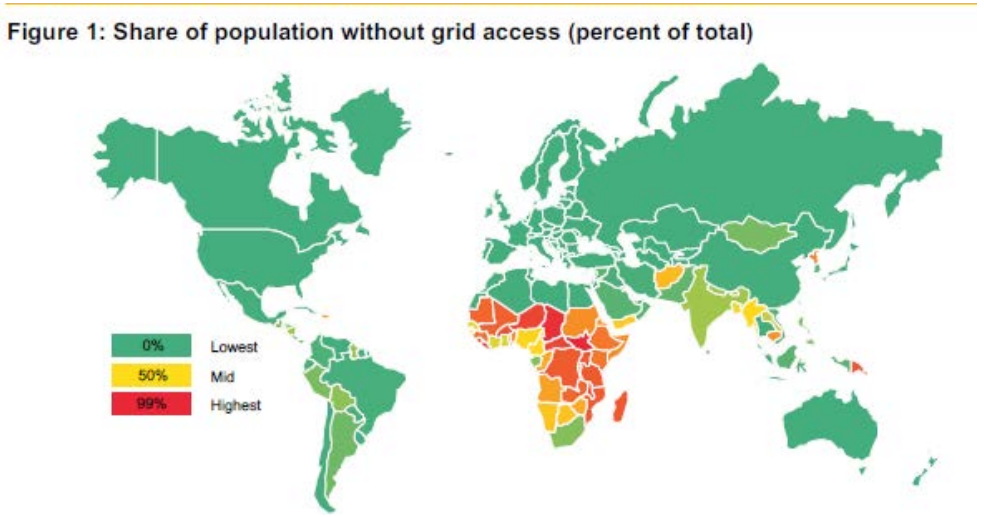
- Investments in off-grid lighting rose by US$276 million, 2012-15
- Leveraged over US$40 million in IDA in Ethiopia, Liberia, Uganda, BF, DRC and Mali

STRATEGIC CONTEXT: OFF-GRID SOLAR

Current market dynamics are not sufficient to lift everyone from energy poverty

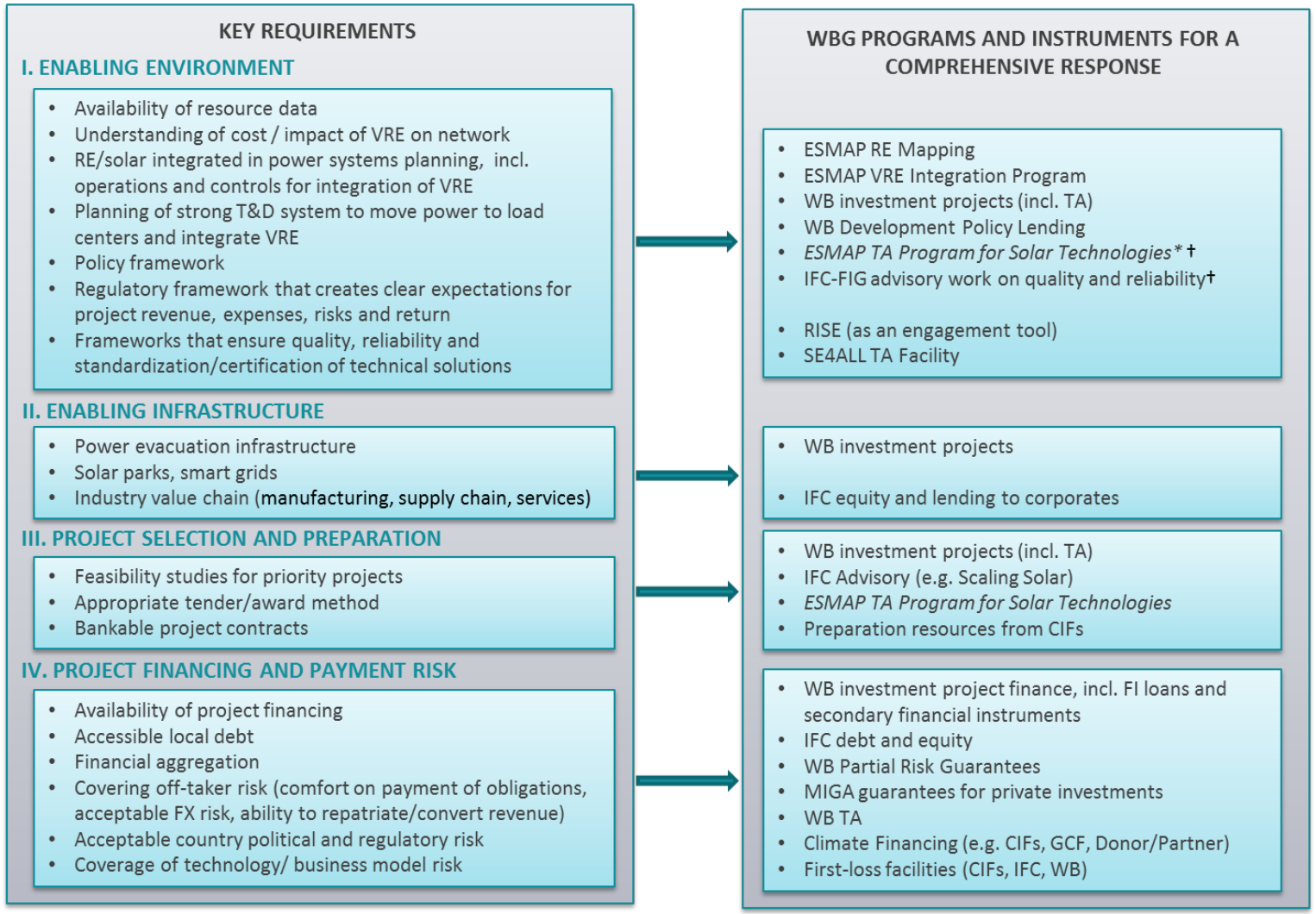
- Still 1.1 billion people without access. 21 million people with branded products = only 2% of 1.1 billion without access. **Significant acceleration still needed** for off-grid to play a major role in the universal access goal.
- **The off-grid market development progress is highly uneven** - Kenya, Tanzania and Ethiopia, account for 66 percent of unit sales in Africa, and India is leading the way in Asia – need to expand/adapt/develop approaches to less attractive markets (e.g. fragile states; last mile electrification efforts…)
- Most sales are solar lanterns (below Tier 1) or basic lighting kits (Tier 1)**. Higher tiers products are still relatively rare**. Availability of affordable high efficiency appliances is still a constraint. High efficiency DC fridges/water pumps and other productive uses extremely rare
- **Solar off-grid markets still a large potential to grow**: high coincidence between solar radiation and off-grid markets





WBG Global Solar Initiative

Objective: ESMAP PROGRAMS WILL PLAY A CENTRAL ROLE IN THE COORDINATED WBG APPROACH TO ADDRESS BARRIERS AFFECTING DEPLOYMENT OF GRID-CONNECTED SOLAR TECHNOLOGIES



* Proposed for inclusion in the ESMAP's 2017-2020 Business Plan, to be formally discussed with donors in April 2016.
† Work on standardization and certification will build on the experiences of EDGE (Excellence in Design for Greater Efficiencies) and Lighting Africa

WBG LIGHTING GLOBAL

Objective: ESMAP WILL PLAY A CENTRAL ROLE IN THE EXPANSION OF LIGHTING AFRICA INTO LIGHTING GLOBAL

- **Geographic:** from Africa to a global WB Lighting Global program, leveraging synergies across regions and between WB and IFC (already expanded to a global program)
- **Products/business models:** all off-grid systems, incl. larger systems for both domestic and productive uses and a variety of business models; targeted support for making energy efficient appliances more available; business models for both the core and marginal markets (e.g., fragile states, last mile electrification efforts)
- ESMAP support focused on traditional Lighting Africa/Global areas (e.g., QA), filling in "missing pieces" (e.g., support to EE appliances, generating knowledge on impacts), and leveraging WB funding for transformative impacts

Market Scoping, Project Structuring & Implementation	Access to Finance	Quality Assurance	Policy and Regulations	Consumer Awareness
• **Country engagement** • **Market assessments** (Global Off-grid Solar Market Trends Reports, Country assessments) • **Feasibility-studies** • **Development/adaptation of business models** for different market types • **Project preparation and implementation** • **Development of tools for individual off-grid programs** • **Impact evaluation**	• **Design of access to finance** (facilitate access to working capital to importers and retailers, use guarantees to reduce risk for commercial lenders) • **Design of Result Based Financing (RBF) program** (in challenging national and regional markets) • **Technical assistance** to Ministries, Financial Intermediaries, Commercial Banks, solar companies	• **Develop quality standards for energy efficient DC appliances** • **Programmatic roll out of quality standards for pico-PV and SHS** • Support to government with the **adoption and enforcement of national quality framework** to minimize market spoilage • **Technical assistance** to National Bureaus of Standards • **Disseminate updated information** on products, technical specifications, quality standards	• Support government with the development of **enabling policy and regulatory environment** to promote off-grid solar systems • Support governments to **mainstream off-grid PV into sector planning**	• **Design of consumer awareness campaigns** • Support **design and implementation of proportional activities** to catalyze commercial sales • **LA communication team** (incl. website, outreach, partnerships, etc.)

OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20

OBJECTIVES	ACTIVITIES	RESULTS-BASELINE $	RESULTS-STRETCH $
Increased number of countries with adequate enabling environments to leverage and accelerate private capital investments in solar technologies	**Country Assessments (on-grid and off-grid)** ➢ Comprehensive country assessments (CAs) are expected to take 2-3 months, including a 1-2 week mission from a WBG team. CAs will focus on the status of the country's enabling environment for solar technologies, including identification of the key barriers to mobilization of financing, and propose focus areas for WBG (as well for other donors and for private sector) support through specific programs and products, including a defined timeline for the various interventions **Feasibility Studies and Project Structuring (on-grid)** ➢ Feasibility studies – incl. project siting, project design, energy yields, cost analysis, land ownership and use status, transmission infrastructure and grid connection, social (incl. gender) and environmental issues, permitting and timeline, financial modelling, risk assessment, etc. ➢ Project structuring – incl. legal due-diligence, preliminary analysis of social and gender and environmental impacts, preparation of bidding documents and assistance to tendering, drafting of project agreements, support with negotiations, support to reach financial closure **Lighting Global (off-grid)** ➢ Continuation of Lighting Africa program ➢ Support to structuring and implementing other region's off-grid solar projects ➢ Development and sharing of tools for practitioners ➢ Advice on gender-sensitive project designs ➢ Supporting impact evaluations, including gender impacts ➢ Transition to a new quality assurance framework – PV lanterns/kits and DC-powered energy efficient appliances **Knowledge Management, & Donor Mobilization (on-grid and off-grid)** ➢ Knowledge management – Analysis and dissemination of lessons learnt and development of knowledge products on cutting-edge issues, some of which in partnership with ISA ➢ Donor mobilization – mobilization of concessional funds for solar investment projects, including in countries supported by ISA ➢ Outreach and partnerships –sponsoring selected events with relevant partners, including ISA	• At least 8 country assessments • Feasibility studies and project structuring completed for at least 7 investment projects • At least 7 new grid-connected solar investment projects financed by WBG and/or other donors and private sponsors • At least 8 WB projects with solar off-grid components supporting growth of sustainable markets, mobilizing private sector funding • At least 6 WB solar off-grid projects/ components with gender-sensitive designs • QA framework for solar kits and appliances • At least 3 knowledge products on solar off-grid market trends, technology etc. • Background note on gender dynamics related to building supply chains and understanding consumer choices • Additional donor funds mobilized	• At least 12 country assessments • Feasibility studies and project structuring completed for at 10 investment projects • At least 10 new grid-connected solar investment projects financed by WBG and/or other donors and private sponsors • At least 12 WB projects with solar off-grid components supporting growth of sustainable markets, mobilizing private sector funding • At least 10 WB solar off-grid projects/ components with gender-sensitive designs • QA framework for solar kits and appliances • At least 4 knowledge products on solar off-grid market trends, technology etc. • Background note on gender dynamics related to building supply chains and understanding consumer choices • Additional donor funds mobilized
Budget	AFR: $14-19M, EAP:$2M, ECA:$1-2M, LCR:$2M, MNA:$1-2M, SAR:$2M	$22 million	$30 million

Partnerships and Implementation

Partners

- International Solar Alliance – ISA*
- CIFs & GCF (potential)
- Bilateral donors (EnDev, Power Africa, DFID, kfW)
- WBG Global Solar Initiative†
- Industry associations: Global Solar Council, GOGLA

Implementation

- Country-program driven
- Country assessments, knowledge management: Bank executed
- Feasibility studies and project structuring: Recipient-executed grants
- Lighting global: Bank executed
- Close coordination with ESMAP RE Mapping and VRE Integration Programs, as well as Mini-Grid Facility,
- Funding to AFREA and ASTAE

* Announced by India's PM at COP21
†The proposal for a WBG Global Solar Initiative is currently under development and will be presented to the Board in March 2016 as part of the WBG Climate Action Plan

Risks & Mitigation

Risks On-Grid	Mitigation
Failure to adequately coordinate the proposed ESMAP TA program with the overarching WBG Global Solar Initiative	• Key ESMAP team members are also part of the core team developing the WBG Solar Initiative
WBG does not commit additional financial resources for solar investment projects	• Inclusion of the WBG Global solar Initiative in the WBG Climate Action Plan is expected to ensure this commitment
Key partnerships do not materialize	• Dialogue with the Government of India on World Bank-ESMAP support to ISA is already ongoing; close dialogue with CIFs is ensured through the WB Clean Energy Global Lead; point persons will be identified for dialogue with all key partners
Limited country demand	• Concerted targeting and demand-led funding for country activities, building on the regular client dialogue through the WBG and specific ESMAP's programs
Risks Off-Grid	**Mitigation**
Lack of interest from WB clients to borrow for off-grid electrification	• Increased interest from client already experienced. Adequate designs, offering customized solutions for clients with different policy and market situations
Duplication of efforts with other stakeholders	• Close collaboration established with all key stakeholders. ESMAP will focus on filling the "missing pieces" for global knowledge and other global goods not covered by other stakeholders; and will leverage WB operational strengths in combining policy and financing support to Governments for integrating off-grid solutions in its drive towards the universal access to electricity

Energy Efficient City Services Project Preparation Facility

SUMMARY

13

Problem Statement

- Energy efficiency in cities is a key enabler in achieving the goals and targets set forth in COP21, the Sustainable Development Goals, as well as in the development strategies of countries.
- As shown by the Global Tracking Framework, progress in achieving the SE4ALL target of doubling the rate of improvement of EE has been slow, and will require decisive actions by development institutions and the private sector.
- The World Bank Group can play a major role in mobilizing finance for energy efficiency projects, and in supporting countries achieve their goals in this context. However, since FY10 energy efficiency lending has been low at only 14 % of total energy sector lending, in spite of significant potential.

Proposed Response

In response, ESMAP proposes to catalyze the WBG's pipeline of urban energy efficiency operations through a facility that will provide grants and technical support for client engagement, project identification, project preparation and implementation support. The facility would also seek to mobilize financing from other development partners. This facility is a continuation of the existing technical assistance component of the City Energy Efficiency Transformation Initiative (CEETI).

STRATEGIC CONTEXT

- Cities are the engines of economic development, generating 80% of global GDP
- They account for two-thirds of world energy consumption and greenhouse gas emissions
- Half of the population currently lives in cities, and by 2050 seven out of ten people will be urban dwellers. Most of that increase will occur in developing countries, particularly in South Asia and Africa.
- Demand for energy in cities is growing rapidly to:
  - Enhance quality of energy services
  - Meet increase in demand for energy services
- Energy efficiency is a means to an end and helps cities meet multiple objectives, including:
  - Lower energy bills and create space for expanding services and financing other priorities
  - Increase energy security and resilience
  - Reduce local and global air pollution
  - Avoid new generation capacity
  - Enhance economic development and competitiveness
  - Enhance livability

ACCOMPLISHED TO DATE: ENERGY EFFICIENT CITIES

THE CHALLENGE

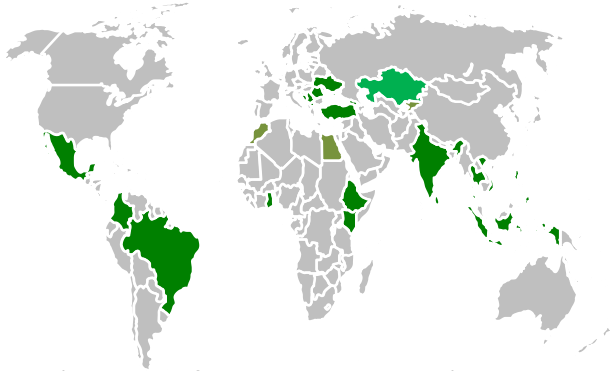
- Cities are responsible for 67% of global energy consumption and GHG emissions
- By 2050, 7 out of 10 people will be living in cities
- Helping cities to reduce energy consumption while providing better services is crucial to the achievement of our energy goals

THE RESPONSE

US$10 million City Energy Efficiency Transformation Initiative:

- Technical assistance programs in 15 countries
- City energy efficiency diagnostics using TRACE tool in 70 cites
- Knowledge production and dissemination which produced 6 guidance notes (and other being finalized
- 4 knowledge exchanges/ conferences

THE RESULT



Mexico (**Ministry of Energy and 32 cities**)

- Municipal EE Project (US$100 million) loan approved by WB in March 2016
- Project benefited from ESMAP TA, and TRACE enabled city EE diagnostics in 32 municipalities (laid foundation for EE investments)

Brazil (**Belo Horizonte**)

- US$100 investment for the replacement of 178 000 lighting points with LEDs using a PPP
- ESMAP TA helped city in preparing bidding documents, doing feasibility studies and identifying the investments using TRACE

Ukraine

- City of Ternopil established a municipal public ESCO and revolving energy efficiency fund using city EE diagnostics results (TRACE)

Lessons Learned

- While cities face similar challenges, solutions need to be adapted to each city's (and country's) situation, including its particular regulatory, institutional and policy framework
- The entry points for successful interventions must be the city's priorities (e.g. cost reduction, better quality or expansion of basic services, reduced congestion and air pollution)
- Successful EE interventions by municipalities can influence citizens and markets
- It is important to look beyond sectors under municipal control and engage with different urban stakeholders, state and national governments and utilities
- Key barriers that must be overcome include:
    - Lack of awareness, information and capacity
    - Low financing capacity
    - Diffuse decision-making
    - Split incentives
- It is a crowded space, with numerous organizations/initiatives providing or coordinating support to cities (C40, ICLEI, SE4ALL, donors, IFIs, Covenant of Mayors, WRI, etc.). Need to coordinate to avoid duplication of efforts, identify leverage opportunities, and disseminate knowledge.

GOING FORWARD

Increased focus on **implementation,** and **mobilizing investment** from the **private sector and other development partners**

ESMAP will use its comparative advantage to:

Influence World Bank Group operations

- Inform and leverage development finance
- Respond to regional demand where there is significant potential (e.g. Asia and Sub-Saharan Africa driven by rapid urbanization and need to expand urban services; Latin America, East Asia and Central Europe, and Middle East and North Africa driven by need for improved services at lower costs)
- Scale up proven concepts
- Create spillover effects to other GPs and entities of the WBG (e.g. urban, transport, water, IFC)

Improve enabling environment for investments

- Remove barriers that prevent private and public investments in urban energy efficiency (knowledge, policy, institutional, regulatory)
- Develop pipeline of investment programs and bankable projects

OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20

OBJECTIVES	ACTIVITIES	RESULTS-BASELINE $	RESULTS-STRETCH $
Increased number of WBG operations with energy efficiency considerations integrated in urban sector projects in public lighting, transport, water and wastewater, solid waste, power and district energy, and industry, **and increased mobilization of finance** from other development partners	**Demand-driven financial and operational support*** for client engagement, project identification, project preparation and implementation support across WB Global Practices and IFC: • Urban energy efficiency diagnostics (e.g., using ESMAP's TRACE) • Energy audits • Pre-feasibility and feasibility studies • Strategic planning and sector reforms in the urban space • Advisory services (e.g., on policy, regulatory and institutional framework) **Knowledge exchange and capacity building** • Client capacity building for investment planning and implementation • South-South-North knowledge exchange events • Database on city energy efficiency • Dissemination briefs on urban energy efficiency	**Outputs** • Support TA for at least 30 cities/regions/countries • At least 5 training events/workshops organized or facilitated for clients • 1 database on city energy efficiency • 4 dissemination briefs on urban energy efficiency **Outcomes** • At least 8 WBG operations informed • At least 20 city plans or projects informed	**Outputs** • Support TA for at least 35 cities/regions/countries • At least 8 training events/workshops organized or facilitated for clients • 1 database on city energy efficiency • 8 dissemination briefs on urban energy efficiency **Outcomes** • At least 10 WBG operations informed • At least 25 city plans or projects informed
Budget	Indicative allocations for operational support: ECA: $4-5M SAR: $3-4M MNA: $1-2M LCR: $3-4M EAP: $2-3M AFR: $2M	$15 million	$20 million

* Call for proposals are gender-informed, and program designs will incorporate gender and social considerations where relevant

Partnerships and Implementation

Partners

- World Bank Global Practices, including:
  - Energy & Extractives
  - Social, Urban, Rural and Resilience
  - Transport and ICT
  - Water
  - Trade and Competitiveness
  - Environment and Natural Resources
  - Others
- IFC
- GEF
- SE4ALL
- City networks
- Other development partners

Implementation

- Mix of Bank-executed and Recipient-executed
- Pipeline development: Country/city-program driven
- Close coordination with other ESMAP programs and development partner activities
- Funding to ASTAE activities

Risks/Success Factors

Risks	Mitigation
Low implementation capacity in cities, particularly of municipal governments, may render technically and economically sound projects unsuccessful	Ensure capacity-building activities are considered in projects, including by other WB units; design and implement adequate delivery models, including through third parties
Unsustainable projects, and proliferation of pilot projects that are not scaled-up or replicated	Prioritize demand-driven operations from committed municipal governments; ensure enabling framework (regulatory, institutional, policy) is in place, together with sustainable financing mechanisms; develop long term visions, linked to cities' long term goals
Insufficient uptake from WBG management and teams	Create awareness among top management (particularly of country offices) of how EE can enhance and support the objectives of the WBG and of its Global Practices; align the objectives of this facility with those of the different GPs; provide sufficient and predictable funding, including by other sources (e.g. GCF); reduce transaction costs for teams
Insufficient uptake from clients, particularly of those high-growth, high-impact, high-potential cities	Address their priorities; create awareness of enabling role of EE; facilitate knowledge exchange among peers

Efficient and Sustainable Built Environment

SUMMARY

14

Problem Statement

- **Buildings are responsible for a significant share of global energy use and GHG emissions**
  - About 1/3 of global energy use and GHG emissions are buildings-related – these could double or triple by 2050
  - Over half of all electricity consumed today is used in buildings
  - Global building stock expanding, driven by rapid urbanization - Projections indicate a growth of 24% between 2013-2023 (Navigant)
- **Buildings offer one of the most cost-effective and economically-beneficial paths** for lower energy consumption and GHG emissions
  - Untapped economically viable potential to improve building energy efficiency is significant (up to 80%, IEA)
- **Lock-in risk**: Today's planning, policy and investment decisions determine the path for the next decades
  - Failing to act now would lock-in inefficient, expensive and high emissions development
- **Key barriers include lack of knowledge & know-how; institutional and regulatory deficiencies, financing challenges and market failures (fragmentation of the sector, insufficient information and split incentives)**
  - Buildings-related work at the WBG is also fragmented – involving different global practices and groups with different objectives

Proposed Response

- A new **4-year program "Efficient and Sustainable Buildings"** building on experience from City Energy Efficiency Transformation Initiative (CEETI) and complementing the Energy Efficient City Services Project Preparation Facility
- **Objectives:** (i) **to scale-up the number of WBG operations and country policies that contribute to sustainable and efficient buildings; and (ii) to increase clients' knowledge and capacity**
- Adopt an **integrated approach that connects different groups/objectives:**
  - Collaboration across Global Practices and IFC to integrate sustainable and efficient energy considerations with other objectives leading to multiple benefits and better solutions package for clients.
- **Support both upstream and downstream WBG buildings-related activities** :
  - Develop guidance and case studies to inform/support integration of sustainable energy in urban spatial development plans and buildings
  - Support buildings-related operations across the WBG
    - Policy analysis and market assessments
    - Pre-feasibility studies & development of business models
    - Piloting of innovative approaches (technologies/techniques, policies)
    - Energy integration in urban spatial development plans
    - Engagement of private sector

STRATEGIC CONTEXT

The built environment:

1. is responsible for a significant share of global energy use and GHG emissions

Energy demand and GHG emissions in cities is large and increasing in developing countries, driven particularly by the building sector, urban growth and urban form

- About **1/3 of global energy use and GHG emissions are buildings-related** – these could **double or triple by 2050**
- **Drivers** include: **Increased access** for billions of people in developing countries **to adequate housing, electricity, improved services and household appliances**, e.g. urban space cooling demand is estimated to increase 5 to 10-fold by 2050 in rapidly emerging developing countries
- **More than 60% of iNDCs include energy efficiency** and **more than 40** make explicit **reference to buildings**

2. offers one of the most cost-effective and economically-beneficial paths for lower energy consumption and GHG

Diffusion of today's available technologies and best practices **could halt energy-use growth in the buildings sector** (IPCC, 2014) and is one of the most cost-effective mitigation measures

- **Estimated 80% of economically-viable energy savings in buildings is untapped** (IEA)
- **Compact urban development can reduce public infrastructure & services (incl. energy) cost by 50%** as urban sprawl entails large capital, operational and maintenance costs with significant energy implications
- **Sustainable and efficient buildings are important for power sector** (e.g., avoided electrical capacity additions and reduced distribution and transmission network expansion)
- **Many low- and zero-energy solution incl. integration of renewable energy sources and deep-renovation are available.** (institutional framework and enforcement mechanisms hamper scale-up in developing countries)
- **Efficient and sustainable built environment provides multiple benefits**, e.g. path to more livable and inclusive cities, adaptation and resilience to climate change

STRATEGIC CONTEXT 2/2

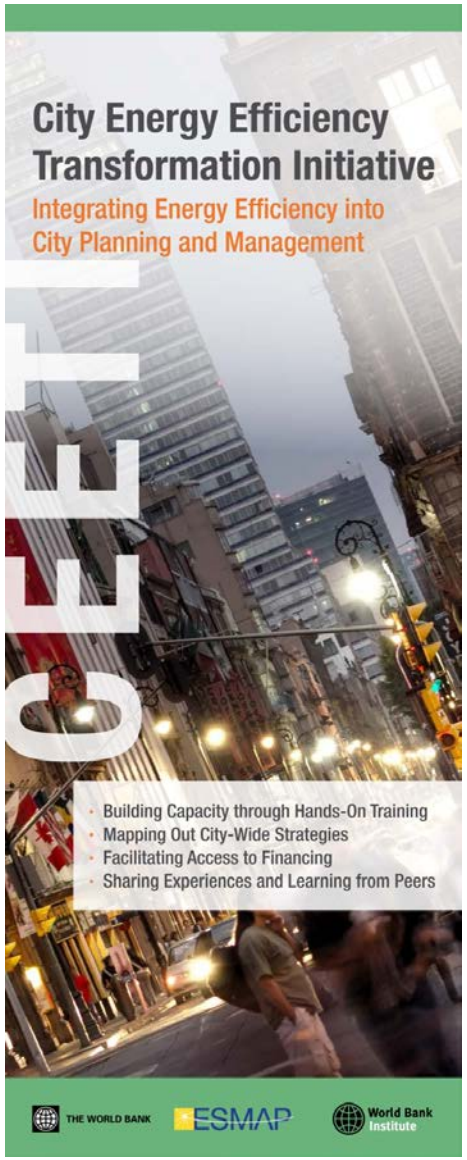
The built environment:

3. locks in pathway for decades	▪ **Urbanization trend, happening in developing countries, creates huge demand for new buildings (especially housing)** ▪ **High lock-in risk**: Urban form is difficult to change once it is established. Lifespans of buildings and retrofits are very long ▪ **Meaningful action is needed now**: Failing to act now would lock-in an inefficient and expensive path with growing energy consumption and GHG emissions
4. is fragmented and suffers imperfect information and split incentives	▪ **Integrated, multi-sectoral approach is needed:** Built environment significantly influences energy consumption, but energy is often not the driver for decisions ▪ **Built environment-related work at the WBG is also fragmented:** operations span across several Global Practices and IFC with different objectives (energy efficiency, resilience, renewable energy, housing and public services, etc.) ▪ **Strong barriers hinder the market uptake of cost-effective opportunities**. Barriers include: imperfect information, split incentives, lack of awareness, transaction costs, inadequate access to financing, and industry fragmentation ▪ **Solutions require engagement of both the public and private sectors,** e.g., public role is key for development of regulatory framework, urban planning and lowering barriers; private sector role is key for investing and scaling-up

ACCOMPLISHMENTS TO DATE

ESMAP has been a key player in promoting urban energy efficiency including buildings among internal and external stakeholders

- The **Efficient and Sustainable Buildings Program** builds on the accomplishments of the ESMAP's **City Energy Efficiency Transformation Initiative** (referenced in the presentation of Energy Efficient City Services Project Preparation Facility):
  - Technical Assistance
  - CEETI-informed Operations & Investments
  - Upgrading of Tool for Rapid Assessment of City Energy (TRACE)
  - Knowledge Exchanges
  - Knowledge Products



OBJECTIVES, ACTIVITIES, & RESULTS, FY2017-20

OBJECTIVES	ACTIVITIES	RESULTS - BASELINE	RESULTS - STRETCH

To (i) scale-up the number of WBG operations and country policies that contribute to sustainable and efficient buildings; and (ii) increase clients' knowledge and capacity	**A) Country engagement and pipeline development**
	▪ TA to support client dialogue, pipeline development, as well as just-in-time policy advice and analysis (~$0.4 m per engagement):
	  ▪ Institutional and regulatory frameworks
	  ▪ Market and good practice assessments
	  ▪ Pre-feasibility studies & development of business models
	  ▪ Urban spatial development plans
	  ▪ Engagement of private sector
	  ▪ Capacity building and training
	▪ Piloting innovative integrated solutions (e.g. address seismic resilience and energy efficiency in one intervention; integrating energy efficiency and renewable energy solutions)
	▪ Facilitate and support cross-sector collaboration, e.g.,
	  ▪ Collaborate with IFC EDGE Green Buildings program (including EDGE tool, codes and incentives, new financial products)
	▪ Mobilize financing for WBG clients (e.g. climate finance)
	B) Develop knowledge and share experience
	▪ Development of guidance and case studies to inform/support integration of sustainable energy in urban spatial development plans and buildings policies and investments
	  ▪ In partnership with other parts of the WBG (e.g. urban, IFC, health, Montreal Protocol, climate change) wherever relevant
	▪ Scoping paper on gender implications of building-related activities
	▪ Outreach and partnerships:
	  ▪ Support peer to peer knowledge exchanges
	  ▪ Contribute WBG experience and operations insights to relevant partners/ global initiatives (e.g. SE4ALL, Global Alliance on Building and Construction, GEF Sustainable Cities Integration Approach Pilot)
		Outputs
		• 8 country engagements in which sustainability and energy efficiency considerations are integrated in buildings-related dialogues and operations
		• 3 knowledge products developed and disseminated to WBG staff, clients and global fora
		• 2 knowledge exchanges (supported or organized)
		
		Outcomes
		• At least 5 buildings-related WBG operations include sustainable energy components
		• At least 7 country buildings-related policies/plans/strategies informed
		• Increased knowledge and capacity in at least 8 countries to assess and inform buildings-related planning, policies and investments
		• Better integrated solutions packages offered to clients
			Outputs
			• 16 country engagements in which sustainability and energy efficiency considerations are integrated in buildings-related dialogues and operations
			• 6 knowledge products developed and disseminated to WBG staff, clients and global fora
			• 4 knowledge exchanges (supported or organized)
			
			Outcomes
			• At least 9 buildings-related WBG operations include sustainable energy components
			• At least 13 country buildings-related policies/plans/strategies informed
			• Increased knowledge and capacity in at least 16 countries to assess and inform buildings-related planning, policies and investments
			• Better integrated solutions packages offered to clients

Budget		$10m	$16m

RATIONALE FOR ESMAP INVOLVEMENT

The ESMAP program will…		Examples
1. …leverage ESMAP's link to World Bank operations	▪ **Opportunity to build on existing client dialogues** and relationships (global presence) ▪ **Ability to provide multi-sectoral approach**: link global practices (GPs) of the Bank ▪ Engagement with both public and private through IFC	▪ In Mexico, EE assessment in 30 cities preceded a US$100 million investment ▪ ESMAP City Energy Efficiency Transformation Initiative successful in bringing together teams from different GPs (water, transport, urban)
2. …provide value added to a field involving multiple players	▪ Disseminate **WB project implementation experience** to key players	▪ Contribute and explore collaboration opportunities with, e.g., **SE4ALL Global** EE Accelerator Platform, **Global Alliance for Buildings & Construction**, **GEF, IEA, WRI, C40**
3. …will engage with private and public sectors	▪ **Support strategic use of public funds to unlock private capital** ▪ **Collaborate with IFC**	▪ **Support foundation and demonstration of "first mover"** project integrating EE and RE in buildings (e.g, regulatory framework, delivery & financing model, seed financing)
4. …will respond to client demands and needs	We anticipate the following regional allocation of the funds: ▪ **ECA (20%):** public and private buildings retrofit ▪ **Africa (15%):** Incorporation EE & RE in growing cities ▪ **South and East Asia (30%):** responding to built environment & infrastructure needs driven by rapid urbanization & need for resilience; ▪ **Latin America (20%)** : EE in public facilities; energy and land-use planning; EE and RE integration ▪ **MENA (15%)**: management of cooling demand in schools, hospitals and universities; EE and RE integration; energy and land use planning	▪ **Country commitments through iNDCs:** – **More than 60%** of countries' iNDCs **include energy efficiency** – **More than 40** countries made explicit **reference to buildings** (including several from Africa) ▪ **Ongoing dialogues with number of countries** offer potential for engagement

Partnerships and Implementation

Partners

- WBG task teams from the Energy & Extractive Global Practice; Social, Urban, Rural & Resilience Global Practice; Education Global Practice; Health Global Practice; Climate Change Cross-cutting Solution; IFC; Global Facility for Disaster Reduction and Recovery (GFDRR)
- External - SE4ALL and the Building Efficiency Accelerator; Global Alliance for Buildings and Construction (Global ABC); GEF (integrated program for sustainable cities and Global Platform for Sustainable Cities); C40; IEA; WRI; Others

Implementation

- WBG partnerships are integral to delivery of new proposed program.
- Including staff from other GPs in development & delivery of program
- Technical assistance and support provided through different entry points, such as Global Programs, WB country dialogues, development policy lending,
- External partnerships are/will be pursued to enhance synergies, broaden awareness and leverage action

Risks/Success Factors

RISKS	MITIGATION
EE is not a priority in World Bank Group operations – lack of awareness, and perception of higher-risk (e.g., uncertain energy savings in the future) and complexity (project design and transaction costs)	• Initial focus on countries with known demand (e.g. iNDCs) and interested task teams to build experience • Develop simple tools and disseminate data • Share experience, workable models and evidence
Built environment is a highly fragmented sector with different players and objectives (e.g., EE, resilience, RE, housing and public services)	• Build program on cross-GP/IFC collaboration • Start partnering where there is interest to demonstrate approaches with replication potential • Document lessons learned and case studies showing the benefits of an integrated approach • Collaborate and engage with relevant international fora (contribute WBG practical experience and knowledge, focus on synergy opportunities and avoid duplications)
Buildings is challenging sector of engagement for World Bank as most building stock is in private sector – primary players are not the World Bank's direct clients	• Support strengthening of public sector role (e.g., policy/regulations and urban planning) in providing framework and tools for private sector engagement • Support WBG activities in public buildings • Support activities that build capacity and leverage private sector (e.g. by working with commercial banks) • Collaborate with IFC