Global Programme Document

Women's Entrepreneurship for Sustainable Energy (WESE)

(March 2016)

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Executive Summary

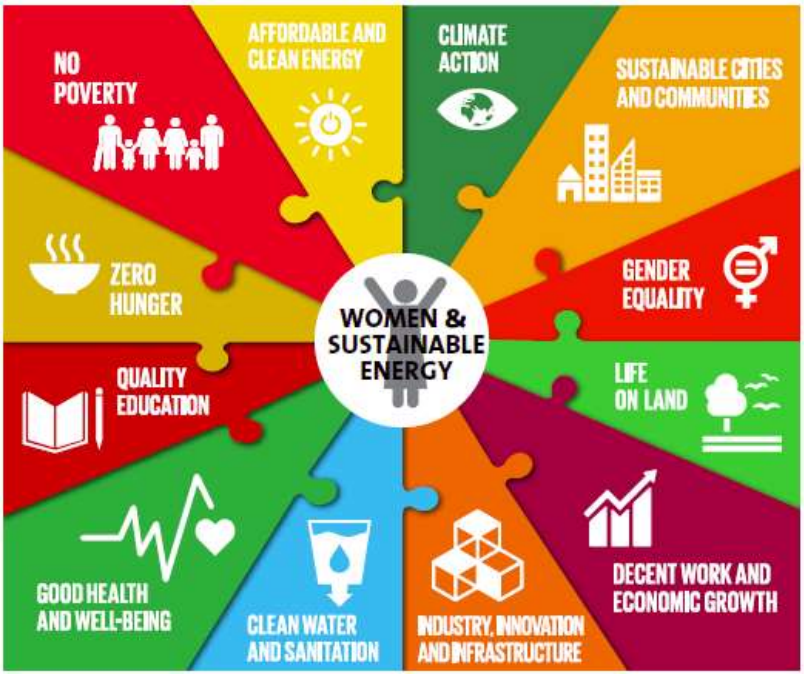
Rapidly falling sustainable energy technology (SET)[1] costs, improving technology quality, and new business models have unlocked new opportunities to accelerate universal sustainable energy access efforts through decentralized solutions. Across developing countries, women are typically the primary household energy managers. They are commonly responsible for providing lighting, heating and cooking in households. Close to their customers, women entrepreneurs have the potential to lower customer acquisition and servicing costs and accelerate SET adoption. However, they remain under-represented in the industry and at the energy policy and decision making levels.

Market transformation policies intended to reduce investment risks to accelerate energy access commonly do not benefit men and women entrepreneurs equally because of existing gender gaps in access to skills, information, technologies, finance, global supply chains, and markets. Existing gender inequalities translate into additional investment barriers for women and less attractive risk/reward profiles for women entrepreneurs in sustainable energy.

This Programme document outlines an approach to engender market transformation and policy efforts for universal sustainable energy access. Such an approach will ensure equal benefits to men and women entrepreneurs and optimize the use of public resources to catalyze private investment. The Programme directly contributes to achievement of the Sustainable Development Goals (SDGs) on Gender Equality (SDG5) and Affordable and Clean Energy (SDG 7), which in turn will have multiplier effects and contribute towards reaching ten other SDGs, particularly by improving livelihoods, health, education, and economic growth; and by increasing access to water and job opportunities.

[1] *Sustainable energy technology (SET) includes energy efficient and renewable energy technologies.*

Figure 1: Contribution of the Programme to the Sustainable Development Goals



Adapted from IRENA (2015). Rethinking Energy

During the initial five-year phase, the Programme will be implemented in Bolivia, India, Indonesia, Morocco, Myanmar, and Senegal. These six participating countries present a wide degree of variation in their energy sectors and markets. Scaling up sustainable energy solutions will therefore require several distinct approaches to address gender-specific barriers. The policy, technology and financial solutions developed by the Programme will subsequently serve as a menu of options for self-starting countries to choose from in the future.

List of Acronyms & Abbreviations

AA	Administrative agent
BAU	Business as usual
BMCE	Banque Marocaine du Commerce Extérieur
CalCEF	California Clean Energy Fund
CAPEX	Capital expenditure
CEDAW	Convention on the Elimination of all Forms of Discrimination Against Women
CGAP	Consultative Group to Assist the Poor
COBEE	Compañia Boliviana de Energía Eléctrica
CRE	Cooperativa Rural de Electrificación
CSI	Cellular Systems International
CSP	Concentrated Solar Power
DEEG	Directorate for Gender Equity and Equality
DFID	Department for International Development
DFI	Development Finance Institutions
DRP	Department of Rural Planning
EE	Energy efficiency
ENDE	Empresa Nacional de Electricidad
EMPODERAR	Emprendimientos Organizados para el Desarrollo Rural Autogestionario
FBPMC	Fondation banque populaire pour le micro-crédit
FDI	Foreign Direct Investment
FONDEP	Fondation pour le Développement Local et le Partenariat (also called Albaraka)
GHG	Greenhouse gas
GDP	Gross Domestic Product
GPRS	General Packet Radio Service
GSMA	Groupe Speciale Mobile Association
HPS	Hightech Payment Systems
ICT	Information and communications technology

IDR	Indonesian rupiah
IFC	International Finance Corporation
INDC	Intended Nationally Determined Contributions
IMF	International Monetary Fund
IPP	Independent power producer
IRENA	International Renewable Energy Agency
LCOE	Levelized costs of electricity
LNG	Liquefied natural gas
LPG	Liquid petroleum gas
LSEE	Local Sustainable Energy Enterprise
MADB	Myanmar Agriculture Development Bank
MEB	Myanmar Economic Bank
MFI	Microfinance institution
MIS	Management information system
MLFRD	Ministry of Livestock, Fisheries and Rural Development
MLFDB	Myanmar Livestock and Fisheries Development Bank
MNCWA	Myanmar National Committee for Women's Affairs
MNRE	Ministry of New and Renewable Energy
MOU	Memorandum of understanding
MVP	Minimum Viable Product
MWAF	Myanmar Women's Affair Federation
NGO	Non-governmental organization
OECD	Organization for Economic Cooperation and Development
OJK	Otoritas Jasa Keuangan (Financial Services Authority of Indonesia)
ONEE	Office National de l'Electricité et de l'Eau Potable
ONP	National Observatory on Parity
O&M	Operations and Maintenance
OPEX	Operating expense
PERACOD	Promotion Programme of Rural Electrification and Domestic Fuels Supply
PICAR	Proyecto de Inversión Comunitaria en Áreas Rurales

PLN	Perusahaan Listrik Negara (State Electricity Company)
PPA	Power purchase agreements
PV	Photovoltaics
RE	Renewable energy
REEP	Renewable Energy & Energy Efficiency Partnership
RIB	Reserve Bank of India
SET	Sustainable energy technologies
SAA	Standard Administrative Arrangement
SDGs	Sustainable Development Goals
SE	Sustainable energy
SE4ALL	Sustainable Energy for All
SETAR	Servicios Eléctricos Tarija
SME	Small and medium-sized enterprise
STEM	Science, Technology, Engineering and Math
TOC	Theory of Change
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNCDF	United Nations Capital Development Fund
UNDG	United Nations Development Group
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNEP DTIE	United Nations Environment Programme, Division of Technology, Industry and Economics
UNIDO	United Nations Industrial Development Organization
UN Women	United Nations Entity for Gender Equality and the Empowerment of Women
USDP	Union Solidarity Development Party
VMM	Vice-Ministry of Women
WAEU	West African Economic Union
WHO	World Health Organization

1. Rationale

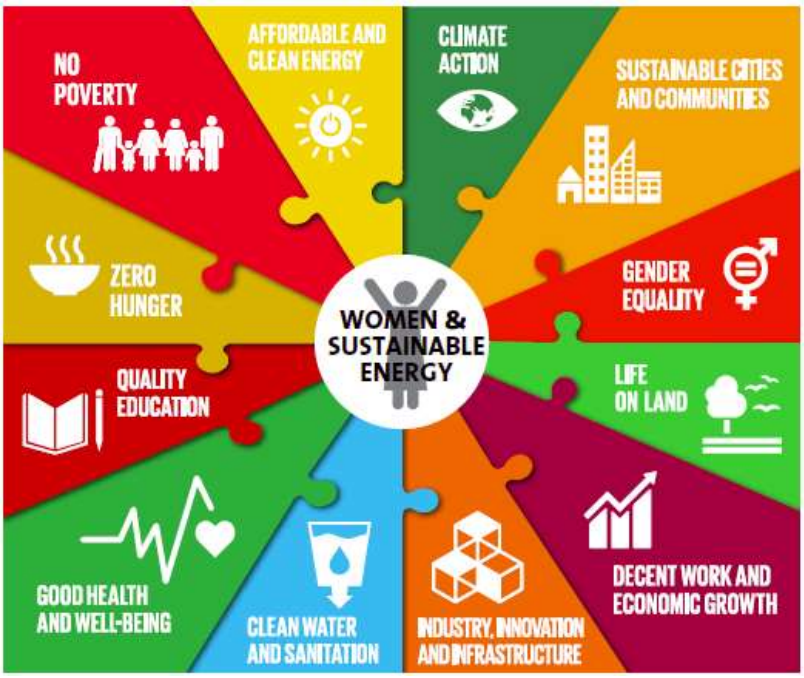
Until the 1980s, investments in large-scale power generation played a central role in national development plans in developing countries. Large-scale power generation investments were expected to drive economic growth and deliver high investment returns.[2] However, due to poor people's inability to afford electricity, electricity consumption and connection rates remained low despite improved availability. As electricity availability did not translate into electricity access and consumption, the financial situation of utilities deteriorated. Ultimately, large-scale electrification programs contributed to the unsustainable debt burden of many developing countries without delivering the expected economic growth. Further, these programs primarily benefitted wealthy households who could afford the high connection costs to the grid in politically prioritized grid-extension areas.

As a consequence of these disappointing results and subsequent reduction in investment, about 1.3 billion people worldwide still lack access to electricity and nearly 2.9 billion people use solid biomass to cook their meals and heat their homes. Energy poverty is most pronounced in sub-Saharan Africa, where 635 million people - two-thirds of the population - lacks access to electricity. It is second highest in developing Asia, with 526 million people or 14% lacking electricity access.[3] Around 65% of primary schools and over 30% of health facilities in sub-Saharan Africa also lack electricity. Based on current trends, it will take until 2080 to achieve universal access to electricity, and the mid-22nd century for access to non-polluting energy for cooking.[4]

To accelerate sustainable energy access, the global development community launched the Sustainable Energy for All initiative in 2012 and included sustainable energy as the 7th goal of the Sustainable Development Goals (SDGs). As shown in the figure below, it is also recognized that sustainable energy access and gender equality (SDG 5) are pre-conditions for reaching most SDG targets. Achieving these goals will have multiplier effects and contribute towards reaching ten other SDGs, particularly by improving livelihoods, health, education, and economic growth; and by increasing access to water and job opportunities.

[2] Pueyo, A., Gonzales, F., Dent, C., & DeMartino, S. (2013): The Evidence of Benefits for Poor People of Increased Access Renewable Electricity Capacity: Literature Review. Brighton: Institute of Development Studies
[3] International Energy Agency (2015): World Energy Outlook 2015
[4] Africa Progress Report (2015). Seizing Africa's energy and climate opportunities.

Figure 1: Contribution to the Sustainable Development Goals



Adapted from IRENA (2015). Rethinking Energy

This historic political commitment to energy access is taking place at a time when falling SET costs, innovative finance instruments and the rapid uptake of mobile technologies with low transaction costs for financial transfers have unlocked pathways for new business models to accelerate energy access through decentralized sustainable energy solutions. These business models have enabled the emergence of a new breed of decentralized energy service companies/cooperatives. In the context of this documents, such companies are referred to as local sustainable energy enterprises (LSEE). These businesses can reach new customer segments by aligning energy service payments to the cash flows of consumers with low energy consumption and ability to pay. Rather than charging the full capital cost of SET upfront to consumers, the LSEE model spreads payments over time. LSEE energy products and services are generally advanced to the customer and payments can be collected manually, through scratch cards, or mobile phones. Cost recovery models include:

- *Pay-for use:* energy users are billed for services consumed (e.g. per full battery charge, hour of supply of a certain service, per kWh)
- *Rental:* end users pay a periodic fee linked to a specified amount of time and/or energy.
- *Rent to own/Lease finance*: Users pay a regular fee for access to time and/or energy. SE assets are sold to customers over time.

These LSEE business models are being used by a diverse range of institutions, including through public private partnerships. For example, in many countries, state utilities, which have a great market penetration and bargaining power with local banks, partner with private SE suppliers to install and maintain decentralized SE technologies. State utilities use favourable loans from local banks to purchase SE equipment. Loans are reimbursed by customers through their utility bills,

and defaults in payment trigger appropriation of the assets by the state utility. In other countries, private LSEEs are the main drivers for decentralized sustainable energy solutions.

The LSEE can also offer a large variety of SETs, including solar home systems, solar devices (e.g. irrigation systems, water pumps, water heaters, cookers, dryers, lamps, charging stations), mini grids, small wind farms, biogas technologies (e.g. efficient cookers, stoves, electricity, dryers), micro-hydro systems, and a variety of energy efficient technologies. Such decentralized SETs are fast becoming the most cost-effective way to produce, distribute and consume electricity for poor households, schools, primary health clinics, and small-scale enterprises in large parts of the developing world, particularly in rural and remote areas. Levelized costs of electricity (LCOE) for mini-grid and off-grid technologies are usually lower than those of on-grid systems, particularly when the grid must be extended by more than 1 km.[5]

Providing universal energy access through decentralized solutions is likely to require substantially less time than through grid extension. Bardouille and Muench believe that a significant proportion of the estimated 1.3 billion people around the world presently living without access to basic levels of modern energy services can be reached through off-grid SET energy solutions by 2030. Modern sustainable energy technologies could be the most cost-effective option for between 67.1 to 75.4 % of the households that would be supplied most economically through mini-grid and off-grid systems.[6] As an added benefit, these technologies generate approximately 8 to 10 times more jobs per gigawatt hour than traditional on-grid fossil fuel power stations.[7]

Access to long-term affordable financing is a key challenge for upscaling the LSEE approach. Low-emission infrastructure technologies typically have higher upfront capital requirements (offset by lower operations and maintenance costs, as compared with fossil fuel-based capacity). Because of their business models, LSEEs depend on affordable finance mechanisms to advance inventory to their clients and allow payments over time, in amounts appropriately sized to local incomes. If firms cannot provide this, consumers cannot access clean technologies.

Long-term affordable finance depends on the real or perceived risks of doing business. Risks arise from various barriers and uncertainties in markets, including information and awareness barriers, technical and capacity barriers, institutional and regulatory barriers, and market barriers[8]. These barriers translate into perceived higher business risks and thus higher hurdle rates for investments. Entrepreneurs therefore require higher expected returns on personal investment and financiers often demand a higher margin and offer less attractive financing terms. In practice, this translates into higher interest rates (debt), higher required returns (equity), shorter loan terms and a higher share of more costly equity in capital structures. Credit scarcity or high credit costs also have downstream effects on every other type of risk.

Entrepreneurs, investors, and policymakers attempt to mitigate investment risk in order to unlock markets by addressing both market and non-market barriers. Notably, traditional on-grid energy service providers mitigate the customer acquisition and customer repayment risks by capturing

[5] International Energy Agency (2014). World Energy Outlook 2014 Report. Paris, France
[6] International Energy Agency (2014). World Energy Outlook 2014 Report. Paris, France.
[7] Practical Action
[8] Glemarec Y. (2012): Financing off-grid energy access for the poor, Energy Policy 47, Pages 87-93.

large, regular cash flows through Power Purchase Agreements (PPAs) with power utilities. Customer acquisition and customer repayment risks are comparatively key risks for LSEEs working with a large base of small customers. One of the main business challenges of LSEEs is to acquire and manage a large clientele that provides steady cash flows. This is key to reassure debt providers on the repayment capacity of the company and access long-term affordable finance.

Women are the primary household energy managers in most developing countries. They are commonly responsible for providing lighting, heating and cooking in households and tend to oversee the smaller, daily household energy transactions. Because they are close to their customers, women entrepreneurs are uniquely positioned to effectively reduce customer acquisition and customer repayment risks of decentralized energy projects in emerging markets. They have enormous potential to manage supply chain and acquire new customers in rural areas, thus driving down the cost of customer acquisition. Further, women are not constrained by cultural norms when interacting with other women.[9]

As stressed by Danny Kennedy, Co-Founder of Sungevity and Powerhouse, and Managing Director of CalCEF [10], "*the technology question has already been figured out for the sector. Now the game is in the cost of customer acquisition. During my time leading Sungevity, we were more successful at lowering this cost when involving women in the design and development of the marketing strategy.*" Despite this comparative advantage, women are severely underrepresented in the sustainable energy sector globally, making up about 20% of the work force in the US and Europe.[11] There are few reliable figures for the developing world, but anecdotal evidence suggests that the figure is significantly lower.

This underrepresentation, despite having a comparative advantage, arises from structural barriers facing women in most countries. The World Bank 2016 report on Women, Business and the Law identifies 155 countries out of 173 that have at least one law impeding women's economic opportunities, with 18 countries where husbands can legally prevent their wives from working. The effect of these discriminatory laws is often compounded by harmful social norms and gender differentiated tasks. Women spend on average 250% more time than men on unpaid domestic and care work, limiting their capacity to engage in new ventures. In addition to being a human rights violation, violence against women can also constitute a major economic barrier, restricting movement and occupational choices. An average of 35% of women worldwide are living with gender-based violence, rising to 70% in some societies.[12]

These barriers translate into unequal access to productive resources such as land, finance, technology, labor, markets, justice, education, skills and information. In turn, this unequal access translates into significant gender differentiated investment risks. As an illustration, women have few property rights, which makes it difficult to collateralize loans and contribute owner's equity. Cheryl Doss, an economist at Yale University, reports "on average, across 10 countries in Africa,

[9] Dutta, S. (2013). Gender briefing notes: Supporting active inclusion of women in energy and development projects. European Union Energy Initiative Partnership Dialogue Facility. Eschborn, Germany.
[10] The California Clean Energy Fund (CalCEF) is a public benefit investment fund created to spur investment and innovation in California's clean energy economy
[11] IRENA (2013): Renewable Energy and Jobs.
[12] UN Women (2015). Progress of the world's women 2015-2016.

39% of women and 48% of men report owning land, including both individual and joint ownership. Only 12% of women report owning land individually, while 31% of men do so." Based on a recent study from UN Women,[13] a full list of gender-different barriers and risks for decentralized energy access can be found in annex 1 of this document.

To facilitate LSEEs' access to long-term affordable finance, national governments and development banks have primarily relied on credit enhancement tools. The standard development finance toolbox includes letters of credit, first-loss capital, over-collateralization, insurance, and reserve accounts. However, the banking sector in developing countries tends to be highly concentrated. In the absence of competitive pressure, banks have limited incentives to open branches in rural areas and lend efficiently to decentralized energy investors. This reduces the effectiveness of credit enhancement instruments to commercial banks. Accordingly, complementary modalities to provide access to credit are currently being explored, including energy lending by microfinance institutions and web-based lending platforms. In some countries, particularly in rural areas, local cooperatives offer members an alternative to banks. For example, farmer cooperatives are able to qualify for loans from larger financial institutions and in turn, lend to their farmers to purchase SET, similar to microfinance institutions. Repayments are deducted from the sales of farmers' products. This reduces the risk of default. Farmers' attachment to land also makes it unlikely that they will move to avoid loan repayments.

However, appropriate credit modalities alone cannot transform a market if there are other barriers to developing bankable projects that are less directly financial, such as onerous licensing processes or limited local supply of skills. Furthermore, ongoing market transformation requires policy efforts to improve the risk-reward profile of decentralized sustainable energy investment tend to assume that market transformation efforts will benefit men and women entrepreneurs equally. By overlooking the specific risks faced by women entrepreneurs because of structural barriers to gender equality, they can unintentionally discriminate against women entrepreneurs and miss an opportunity to promote gender equality by leveraging the comparative advantages of women.

The variety and severity of gender specific risks mean that any gender responsive market transformation effort is likely to be hampered by a combination of investment barriers linked by complex power dynamics. In order to capture latent growth potential of the LSEE model by ensuing an equal-playing field for women-led energy firms, it is necessary to take an integrated approach that addresses all barriers faced by women entrepreneurs as discreet efforts to tackle a given barrier in isolation might be frustrated by lack of progress on other barriers. A coordinated bundle of interventions can simultaneously unlock income generating opportunities for women entrepreneurs; create and enhance income generating opportunities for new customers; drive greater financial efficiency in the LSEE sector; and accelerate universal access to sustainable energy solutions.

The opportunities and risks faced by women entrepreneurs are context specific. Thus, efforts to promote women entrepreneurs and increase women's leadership in the energy sector will need to identify the main context-specific gender-disaggregated barriers, and then propose a series of

[13] Glemarec Y., Bayat-Renoux F., Waissbein O. (2016): Removing barriers to women entrepreneurs' engagement in decentralized sustainable energy solutions for the poor

targeted instruments to eliminate, mitigate, transfer, or compensate for various forms of risk. The next section reviews the opportunities and barriers to increasing the number of women in the sustainable energy sector, with a primary focus on decentralized energy, in each of the six countries participating in this Programme.

2. Country Profiles

The Programme's focus countries are Bolivia, Senegal, Morocco, India, Myanmar, and Indonesia during its initial 5 year period. This Programme intentionally targets six countries with a wide degree of variation in their energy sector and markets, from countries with full electrification pursuing an agenda to broaden the range of energy services to countries with low connection rates that need to enable first-time energy access. Enhancing the effectiveness of women entrepreneurs in scaling up sustainable energy solutions will therefore require several distinct approaches to addressing gender-specific barriers. As a result, the policy, technology and financial solutions developed by the Programme will subsequently serve as a menu of options for self-starting countries to choose from in the future.

This section provides a summary profile of each country in terms of (1) the key energy challenges; (2) the potential for decentralized SETs to address some of these challenges; (3) the capacity of the financial sector to support the development of SETs; and (4) the opportunities and barriers for women entrepreneurs to drive SETs. In order to provide an illustration of potential RE markets in focus countries, this section uses simulations from the Solutions Project's model, which looks at what a transition to a 100% sustainable energy technology mix by 2050 could look like in each market.[14] Expanded country analyses are available in Annex 3 of this document.

The country profiles were prepared to educate the overall theory of change of the Programme. As part of the adaptation process of this global theory of change to local contexts, they will be further developed and refined during the inception phase of the Programme.

14 The Solutions Project was founded in 2011 by Stanford University professor Mark Z. Jacobson and prominent bankers, public figures, and climate scientists to drive a transition to 100% sustainable energy by 2050. Consistent with the evolution of RETs over the past decade, these simulations are based on the assumptions that the key barriers to a rapid transition to universal sustainable energy are more of a policy and social than of a technical nature.

BOLIVIA

Key Energy Challenges

Bolivia's energy sector has two striking features: high urban electrification rate (97%) compared with a low rural electrification rate, with estimates ranging from between 28% and 50%,[15] to 68%[16] and a 2.4%[17] penetration of sustainable energy (solar and hydro). By 2025, the government plans that 100% of the population will have access to electricity. Bolivia's energy subsidies are relatively large (5% of GDP[18]). A state-owned power generation, transmission, and distribution firm, *Empresa Nacional de Electricidad* (ENDE Corporation), dominates the market. A private company, *Compañia Boliviana de Energía Eléctrica* (COBEE) is another major player. Both provide grid-connected energy solutions. The off-grid sector, known as *Aislado*, is much smaller and dominated by IPPs that primarily serve the northern and western portions of the country. The *Aislado* sector is characterized by low per capita consumption and costly supply chains.

Potential for Decentralized SETs to address some of these energy challenges

In 2014, total electricity demand in Bolivia was 1.3GW while the nation's energy sector supplied 1.6GW. The combination of excess supply and an underserved rural population suggests high grid extension costs and growth opportunities in the *Aislado* sector. Further, the Solution Project estimates an 18.7% share for rooftop solar in its 100% RE mix by 2050. There is a significant opportunity to build on existing *Aislado* IPP capacity. Three IPPs dominate the market: SETAR (*Servicios Eléctricos Tarija, S.A.*), ENDE (*Empresa Nacional de Electricidad*), and CRE (*Cooperativa Regional de Electricidad*). In aggregate, these serve more than 90,000 customers with more than 75 MW of capacity.

Capacity of the financial sector to support the development of SETs

Mobile penetration in Bolivia is high,[19] and supports the LSEE model. Mobile Money for the unbanked cite Bolivia as a competitive market for mobile money providers. Improving access to finance, particularly for SMEs in rural areas, is a government priority. Measures taken include formalization of financial services, opening rural bank branches, and providing conditional cash transfers. Development finance institutions (DFIs) also run several anti-poverty programmes that specifically target women-led initiatives. *Proyecto de Inversión Comunitaria en Áreas Rurales* (PICAR), a community-driven development programme that allows local committees to identify investment priorities and administer government funds. The programme has funded 700 "subprojects" impacting 150,000 individuals and aims to double its reach by 2019.

Opportunities & Barriers for women entrepreneurs to drive SETs

Women's rights are guaranteed in Bolivia's 2009 Constitution and gender equality has been recognized in a number of laws.[20] Women's associations and local cooperatives are strong. Economic opportunities for women are also increasing, with a decline in the female unemployment

[15] OECD/IEA 2014
[16] Government of Bolivia
[17] IRENA 2015
[18] IMF 2015
[19] Lancaster, H. (2015). Bolivia - Telecoms, Mobile, Broadband and Digital Media - Statistics and Analyses. BuddeComm have estimated mobile penetration at 101.6%
[20] Including in access to land (Law no 3545)

rate from a highest value over the past 22 years of 6.80% in 2003 to 3.20% in 2013.[21] However, women in Bolivia still face a number of barriers, particularly with regard to access finance. While 22,9% of households are female headed,[22]only 38% of women adults have an account at a financial institution, compared with 44% of men.[23] The Government's emphasis on gender equality coupled with the strong penetration of mobile money technologies and a tradition of local, cooperative-driven development could create a unique role for women in expanding the *Aislado* sector. Women, who hold over 60% of the seats on PICAR investment committees[24]could also play an important role in developing SE projects that could then be financed by domestic government agencies, development banks, and donor countries.

INDIA

Key Energy Challenges

Coal-based power plants continue to dominate India's energy sector. However, the Ministry of New and Renewable Energy oversees India's rapidly growing clean and sustainable energy sector, which includes primarily solar, wind, micro hydro and biomass-based energy sources. Installed capacity from non-hydro non-nuclear sustainable energy sources currently stands at 13%, while nuclear energy comprises 2% of total installed capacity and hydro accounts for 15%.[25]

Potential for Decentralized SETs to address some of these energy challenges

With a large rural population,[26] vast geography, and heterogeneous income levels, sector growth will vary significantly between Indian states. Overall, most of the growth opportunities are in decentralized solar.[27] The solar industry in India is particularly well-developed, with companies that have existing operational capacity and scalable business models. There are also a number of social enterprises, which are typically in need of working capital and added technical capacity There are also enormous opportunities to deploy SETs in productive use and timesaving applications. However, decentralized SE solutions face a number of market, regulatory and financial barriers, including petroleum-based subsidies in many states and a WTO dispute involving its main solar programme.[28]

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[21] ILO statistics, 2013 and 2009, Country Profiles, Bolivia. Unemployment rate of women. Available at: http://www.ilo.org/ilostat/faces/home/statisticaldata/ContryProfileId?_afrLoop=101215730401052#%40%3F_afrLoop%3D101215730401052%26_adf.ctrl-state%3Dtgjiebnjt_158

[22] World Bank, Health, Nutrition and Population statistics, 2008. Available at: http://databank.worldbank.org/data/reports.aspx?source=health-nutrition-and-population-statistics

[23] World Bank, Financial Inclusion Data/ Global Findex, 2014

[24] Sanjinez, X. R. (2015). Taller sobre Iniciativas Empresariales de Mujeres en Desarrollo Sostenible y Acceso a Energía [Powerpoint slides].

[25] BP Statistical Review of World Energy 2015

[26] According to the World Bank data 2011-2015, 68% of people in India live in rural areas.

[27] At a high level, various forms of solar comprise more than three quarters of The Solutions Project's 2050 100% renewable goal

[28] The Jawaharlal Nehru National Solar Mission, the main policy instrument through which the MNRE has sought to increase solar capacity in India, has been challenged in the dispute settlement of the World Trade Organization by the United States for its domestic content requirements (India — Certain Measures Relating to Solar Cells and Solar Modules. World Trade Organization. Dispute Settlement: Dispute DS456. Retrieved from: https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds456_e.htm)

Capacity of the financial sector to support the development of SETs

While access to banking services and finance is low[29], it is increasing. Between 2011 and 2014, access to bank accounts increased from 35% to over 50%.[30] Microfinance institutions are widespread. In 2015, there were 156 reported MFIs with a branch network of 12,221 employees, reaching approximately 37 million clients.[31] The government believes that mobile phones provides one among several possible solutions to the last-mile problem that has plagued banks and credit cooperatives. Mobile phones have penetrated the Indian countryside at a rapid pace. As of 2011, 59% of Indian households owned a mobile phone.[32] India also has several development banks that provide financing for businesses.

Opportunities & Barriers for Women entrepreneurs to drive SETs

In 2015, women constituted 12.4% of parliamentarians in India[33]. This limited participation in political decision-making contributes to policies, including in energy, that are not gender-sensitive. Similarly, while a number of programmes promoting decentralized renewable energy systems/devices have been implemented in the country, none have taken a gender focus.[34] This creates a unique opportunity for women in this Programme. Women have limited technical skills and access to formal credit. Only 43% of women adults possess an account at a financial institution in comparison to 62% of men.[35] Yet women have successfully create formal and informal savings and self-help groups which can be registered by the banks. India has indicated its interest in piloting de-risking strategies with such groups. There also may be opportunities to incentivize existing private companies and social enterprises to incorporate women into their workforces.

INDONESIA

Key Energy Challenges

Indonesia's unusual geographic and demographic characteristics influence the country's energy sector to an exceptional degree. Approximately 6,000 of the more than 17,500 islands in the Indonesia archipelago are inhabited. About 78% of the population lives on two islands, Java and Sumatra.[36] The wide dispersion of the remaining 22% (56 million) Indonesians presents a challenging market for the provision of basic infrastructure like electricity. *Perusahaan Listrik Negara* (PLN), the state-owned energy company held the exclusive right for generation and distribution until 1985, when IPPs were allowed to sell to PLN's grid due PLN's difficulty keeping up with rapid growth in power demands (around 9% per year).[37] Rural electricity cooperatives can both generate and distribute power. Despite enormous potential for sustainable energy, Indonesia

[29] 21% of adults in the world and two thirds of adults in South Asia without access to banking services reside in India (World Bank Report, 2015: The Global Findex Database 2014 - Measuring Financial inclusion around the world).
[30] World Bank Report, 2015: The Global Findex Database 2014 - Measuring Financial inclusion around the world
[31] Sa-Dhan Association of Community Development Finance Institutions, 2015: The Bharat Microfinance Report 2015, p.XV. Available at: http://indiamicrofinance.com/wp-content/uploads/2015/10/Bharat-Microfinance-Report-20151.pdf
[32] Kurtz, A. In India, more cell phones than toilets. CNN Money.
[33] Women in Parliaments : World classification, December 2015.
[34] For example Mahila Urja Centre, Mohalla Mandal, Rajnandgaon, Chhattisgarsh launched in June 2012; the Renewable energy Centre in Bolangir, Odisha launched in June 2012
[35] World Bank, Financial inclusion data/ Global Findex, 2014. Available at: http://datatopics.worldbank.org/financialinclusion/country/india
[36] Badan Pusat Statistik. Retrieved from: http://www.bps.go.id/linkTabelStatis/view/id/1267
[37] Power in Indonesia: Investment and Taxation Guide. (April 2013). PwC.

is increasingly reliant on imported oil. McKinsey (2014) estimates oil imports growing at 5-6% per year through 2030, when 75% of Indonesia's oil will be imported. Poor data, lack of political will, weak regulatory frameworks, and most of all, the Government's massive oil subsidy, which for example, exceeded $15 billion in 2013, have all been cited as barriers to creating an off-grid energy sector.[38] Small populations with low per capita demand also present unfavorable risk-reward profiles for potential investors.

Potential for Decentralized SETs to address some of these energy challenges

Indonesia presents two distinct market segments. The first is in off-grid solutions for rural populations unlikely to receive grid access in the coming decades. Addressing this need will rely on gaining access to concessional or grant financing (through for example gradually phasing out fossil fuel subsidies and redirecting part of the fiscal savings to decentralized sustainable energy solutions). The second opportunity leverages the state's control, through PLN, of electricity distribution while allowing for IPPs to sell to the grid. This creates opportunities to create new, sustainable energy IPPs with a creditworthy off-taker (the state).

Capacity of the financial sector to support the development of SETs

Over 60% of Indonesians have a mobile phone and more than 75% have access to one. Approximately 68% of Indonesians in rural areas own or can borrow a phone.[39] In 2009, Indonesia's central bank created the regulatory framework for a mobile money platform to serve the country's unbanked, estimated at 60% of Indonesia's 250 million citizens. Indonesia's Financial Services Authority (OJK) has created the *Laku Pandai* programme to promote savings accounts with a focus on low-income rural communities. This could drive mobile finance growth in the coming years and presents an opportunity for lease-to-own solar asset models as a complement to or replacement for service (i.e. pay-as-you-go) models in these communities. The central government has village financial assistance program ("*Dana Desa*"), which provides $100,000 per year to villages to use on projects that they prioritize.

Opportunities & Barriers for women entrepreneurs to drive SETs

In Indonesia, 40% of the population (103 million Indonesians) still relied on biomass for cooking in 2011.[40]. The time women spend on biomass and water collection limits their access to other income generating opportunities. While women hold only 17.1% of Indonesian Parliamentary seats, the 2000 Presidential Decree on Gender Mainstreaming directs all government ministries and agencies at the national and local levels to adopt a gender mainstreaming strategy in the planning, implementation, and monitoring of development policies and programmes. The *Dana Desa* Programme offers an opportunity for communities to finance time saving and productive SETs. Women could also be trained in operations and maintenance of such SETs.

[38] "Unpriming the Pump." *The Economist*. 22 June 2013. Web. 09 Feb. 2016.
[39] Financial Inclusion Insights: Indonesia. (2015). Retrieved from: http://finclusion.org/country-pages/indonesia-country-page/
[40] IEA 2015.

MOROCCO

Key Energy Challenges

Morocco imports more than 94% of its energy inputs and electricity.[41] This heavy reliance on imports represents "a significant burden on the balance of payments, and, insofar as some energy supplies are subsidized, a drain on the budget."[42] Currently, 8.5% of total primary energy supply consists of renewable energy.[43] Since 2005, a 1.4GW interconnection from Spain has fed the Moroccan grid. Morocco's 2009 National Energy Strategy highlights increasing regional integration with an eye for export, along with increasing the share of sustainable energy, implementing energy efficiency upgrades, and promoting foreign investment. Morocco has more than 700MW of wind capacity, 1,000MW more in the pipeline, and according to the National Energy Strategy, plans to add 2GW of wind power, along with 2GW each of solar and hydropower by 2020. This would grow the share of sustainable energy to 42%.[44] Over the past two decades, the electrification rate skyrocketed from 18% in 1996 to more than 99%. In 2015[45] The Government has also put in place the Global Rural Electrification programme, which aims to achieve 99.7% of rural electrification during the period 2006-2016, with over 2,970 villages electrified through solar equipment. However, in rural contexts, the electrification rate reflects distribution infrastructure to villages, not individual households. The percentage of households connected to electricity is expected to be lower, though there are no precise figures.

Potential for Decentralized SETs to address some of these energy challenges

Given the high grid penetration and consumer preferences for it, a successful SE strategy will complement grid capacity, rather than replace it. One key opportunity in this environment is energy efficiency firms focusing on rooftop solar water heaters and net-metered mini-grids. Many advanced markets in OECD countries with similar grid penetration have added SE capacity with this approach. Solar hot water heater-centered energy efficiency businesses are relatively easy to finance. Consumers realize a net savings on monthly energy bills, which could be used to make payments to the LSEE. These opportunities are highly bankable because energy savings can be forecasted. A second opportunity is developing a feed-in tariff law for individual connections and mini-grids. The experience of OECD countries shows that a feed-in tariff law for individual connections creates robust market opportunities for third-party service providers.

Capacity of the financial sector to support the development of SETs

Overall, the Moroccan banking sector is quite well-developed. Forty one percent of adults (53% in urban and 19% in rural areas) in Morocco have access to formal financial products and services. Of the 13 million lacking access many are poor, female and live in rural areas.[46] The BMCE Bank of Africa, among the largest banks in Morocco, is building a clean energy portfolio. It has issued

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[41] World Bank Data. Energy imports, net (% of energy use). Retrieved from: http://data.worldbank.org/indicator/EG.IMP.CONS.ZS; Government of Morocco.
[42] IEA 2014
[43] IEA 2014
[44] Morocco 2014 - Energy Policies Beyond IEA Countries. IEA. Retrieved from: https://www.iea.org/Textbase/npsum/morocco2014sum.pdf
[45] "Rural Electrification Rate in Morocco, 1995-2011." European Parliamentary Research Service. N.p., 14 May 2013. Web. 09 Feb. 2016.
[46] World Bank (2014): Enhancing Financial Capability and Inclusion in Morocco. Available at: http://responsiblefinance.worldbank.org/~/media/GIAWB/FL/Documents/Publications/Enhancing-Financial-Capability-and-Inclusion-in-Morocco-FINAL.pdf

debt instruments for large-scale projects, and its asset management entity, has launched the country's first socially responsible investment fund. BMCE has also undertaken research to create financial products that meet the specific needs of women entrepreneurs. There are 13 MFIs in Morocco, which only provide credit rather than traditional banking services. In 2008, large amounts of bad debt led to a microfinance crash. MFIs have been reappraising their strategies in the wake of this event. It is likely that this sector is underexploited and deserves serious reappraisal. Mobile telephones have a penetration of 113%, with approximately 90% of that amount comprising prepaid phones. A 2012 IFC report projected that "the combination of high mobile penetration and a significant portion of the population not using formal financial service channels means there is an opportunity for mobile money."[47]

Opportunities & Barriers for women entrepreneurs to drive SETs

Morocco's 2011 Constitution enshrines men and women's equal rights and the equal access of women and men to elective functions. Consequently, the Governmental Plan for Equality (2012-2016) aims to promote gender equality and integrate women's rights in public policies and development programmes. However, in practice Moroccan women continue to face certain discriminatory cultural practices, which limit their access to education, finance and employment opportunities. According to a World Bank survey from 2014, men are 20% more likely to access loans than women. The lack of access to financial services has limited economic opportunities for women entrepreneurs, with the share of women-owned businesses in Morocco stagnating around at 10-12%[48]. In addition, women represent only 5,97% of the board directors in the top 500 private companies in Morocco, and over 60% of these companies have no women in their governing body.[49]As the primary household energy managers, women in Morocco are well-positioned to manage SET businesses meeting untapped rural demand, particularly for energy efficiency products. The role of women in the Government's programme could also present opportunities to increase their engagement in this sector.

MYANMAR

Key Energy Challenges

At around 30% (16% for rural households), Myanmar has one of the lowest electrification rates in the world.[50] The government has prioritized energy access and aims to achieve universal access by 2030 for its 50 million citizens, which when combined with a population density of 82 people/km^2 is an achievable target. The government has taken important steps toward universal access by expanding the national grid by 15% per year for the last five years. Old hydroelectric power stations supply the majority (70%) of the power, with gas comprising 27%. The remaining three percent, estimated at 120 MW, comes from micro-hydro and diesel generators. Hydro stations profitably generate power at 35 to 50 kyat per kWh (roughly US $0.03 - $0.04). New

[47] Flaming, M., Tarazi, M., and El Sayed, C. (May 2012). Country Report: Morocco. *IFC Mobile Money Scoping*.

[48] World Bank, 2007: The environment for Women's entrepreneurship in the Middle East and North Africa Region, p.10.

[49] African Development Bank, 2015: Where are the women: inclusive boardrooms in Africa's top listed companies? p.14. Available at: http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Where_are_the_Women_Inclusive_Boardrooms_in_Africa's_top-listed_companies.pdf

[50] Myanmar: Off-Grid Renewable Energy Demonstration Project. (April 2014). Asian Development Bank. Retrieved from: http://www.adb.org/projects/47128-001/main

hydro or gas generation would have to charge between two to three times the local market rates to cover costs, with distribution line extension comprising a large portion of these costs.

Potential for Decentralized SETs to address some of these energy challenges

The World Bank has recently approved the National Electrification Project, a US $567MM programme. While $300MM is allocated for grid extension, $80MM specifically targets off-grid electrification for "remote communities unlikely to receive grid access in the next 10 or more years." This portion of the financing will cover solar PV devices, mini-grids, and connections for health clinics, schools, and other civic infrastructure.

Capacity of the financial sector to support the development of SETs

In terms of access to finance, 23% of adults have access to bank account.[51] The government has set a goal for 80% financial inclusion by 2020.[52] Overall, the banking sector is relatively tightly regulated. Myanmar does have a combination of informal and formal MFIs. In 2011, the government allowed the establishment of private microfinance operators. Regarding mobile payment, it is expected that the Central Bank of Myanmar will release the implementing regulations for mobile money platforms in 2016.[53] This, together with the trends in microfinance could unlock major potential for LSEEs.

Opportunities & Barriers for women entrepreneurs to drive SETs

With 70% of Myanmar's population in rural areas, the education and skill gender gap is one of the main barriers for women. Women holding 13.2% of the seats in Parliament,[54] and while there are legal provisions for equal economic rights, only about 75% of women were undertaking income-generating activities in 2015 in comparison to 82% of men.[55] Women tend to be employed in low-skilled positions. They also have less access to financial services. In 2014, only 17% of women adults had an account at a financial institution in comparison to 29% of men.[56] According to the National Electrification Plan, Village Electrification Committees, with 50% participation from women will be established to perform operations and maintenance functions. This provides an important entry point for increasing women's engagement in the sustainable energy sector. Further, because the off-grid sector is nascent, women have a unique advantage. They are not competing with incumbents (in most cases, men) for the establishment of, and positions within LSEEs. Myanmar could seize the opportunity presented by the World Bank's concessional financing for off-grid projects by attaching a gender requirement to the deployment of the funds. Involving women in these projects would lay a foundation of technical proficiency among women that would unlock potential for the first generation of LSEEs in the future. Information and communication will be important to reach women, particularly in rural areas.

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[51] World Bank Report, 2015: The Global Findex Database 2014 - Measuring Financial inclusion around the world. Indicator Table: Account penetration, p.84. Source: Global Findex Database

[52] Shrader, L., and Htun, P. (22 January 2015). Setting the Stage for Mobile Money in Myanmar. CGAP.

[53] Barton, J. (25 November 2014). Telenor readying mobile money with Yoma in Myanmar. Developing Telecoms.

[54] Women in Parliaments: World Classification, December 2015. Available at: http://www.ipu.org/wmn-e/classif.htm

[55] World Bank, Labor force participate rate, male/female (% of male/female population ages 15+) (modeled ILO estimate). Available at : http://data.worldbank.org/indicator/SL.TLF.CACT.MA.ZS and http://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS.

[56] World Bank, Financial Inclusion Data/ Global Findex, 2014: Account at a financial institution, female (%age 15+). Available at http://datatopics.worldbank.org/financialinclusion/country/myanmar

SENEGAL

Key Energy Challenges

According IRENA (2012), most of Senegal's electricity capacity comes from diesel-run generators operating beyond their design life span, and distributed on a poorly maintained and aging grid. The relatively high cost of electricity to consumers excludes funding grid expansion, maintenance, or replacement with increased tariffs. This leaves the energy sector dependent on external support and subsidies from public finance to maintain an affordable electricity tariff for consumers. Further, all fossil fuels are imported, exposing the Senegalese economy to price volatility. Since the 1970s, Senegal has subsidized LPG to reduce reliance on biomass fuels (54% of energy consumption). However, the subsidy programme has been described as "successful but not sustainable,"[57] and in 2009, the government removed all LPG subsidies. While Senegal has a high potential for solar, wind, and hydropower, sustainable energy currently has a low share of total energy capacity in the country. Government officials have cited access to finance and technical capacity as barriers to off-grid energy sector growth. Additional barriers include high taxes for solar hardware.

Potential for Decentralized SETs to address some of these energy challenges

The current national energy plan targets improved management and investment strategies. As part of this plan, Senegal announced a US $583MM investment next year. The primary goals are to diversify the sources of electricity, including the addition of 100 MW of solar capacity, and to expand regional connectivity, renewing a commitment to rural electrification that includes a targeted increase from 30% in 2014 to 60% by 2017.

Capacity of the financial sector to support the development of SETs

Senegal is still an overwhelmingly cash-based economy. On average, 15% of Senegalese have a bank account.[58] Formal financial services are concentrated in Dakar, with half of financial access points being located in the capital city.[59] Microfinance small, but rising share of the financial sector, targeting especially low-income households. There is also a growing mobile money sector. All this, along with Senegal's steady growth bolstered by optimistic sounds from credit ratings agencies, paint a positive picture for the future of Senegal's off-grid energy sector. SET expansion will benefit from strengthening technical capacities and policy support.

Opportunities & Barriers for women entrepreneurs to drive SETs

Despite on-paper equality, discriminatory practices, especially in the context of family and inheritance, persist. In particular, rural areas are still dominated by some customary and religious practices that discriminate against women. Similarly, while women and men enjoy the same legal rights to own bank accounts and access bank loans, in reality women often struggle to obtain loans. In 2014, only 8% of women in Senegal had a bank account in comparison to 16% of men.[60] At the

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[57] Laan, T., Beaton, C., and Presta, B. (2010). Strategies for Reforming Fossil-Fuel Subsidies: Practical lessons from Ghana, France and Senegal. *Untold billions: fossil-fuel subsidies, their impacts and the path to reform*.

[58] World Bank Global Findex Database. Retrieved from: http://datatopics.worldbank.org/financialinclusion/

[59] MIX Market, Microfinance Geographical Index, Senegal Map of Financial Inclusion. Available at: http://finclusionlab.org/country/senegal/analytics

[60] World Bank, Financial Inclusion Data/ Global Findex, 2014: Account at a financial institution, female (%age 15+). Available at http://datatopics.worldbank.org/financialinclusion/country/senegal

same time, 29.4% of households in Senegal are female-headed.[61] There are also significant gender skills gaps. With the right technical and training support, and access to finance, Senegalese women could establish potentially lucrative LSEE supply chains.

[61] World Bank Statistics, 2014: Female headed households (% of households with a female head). Available at: http://data.worldbank.org/indicator/SP.HOU.FEMA.ZS

3. Programme Strategy & Results

Engendered interventions are necessary to overcome the gender-specific barriers holding back the latent potential of women in the SET sector and reducing its financial efficiency. According to the renewable energy policy network REN21, "since 2004, the number of countries promoting sustainable energy with direct policy support has nearly tripled, from 48 to over 140."[62] Increasingly, developing and emerging countries are setting targets and implementing policies in support of renewable energy and energy efficiency.[63] The approaches introduced by this Programme complement these existing policies and targets to support sustainable energy scale-up trough women's entrepreneurship and their social, economic and political empowerment and leadership.

This Programme will identify and address the fundamental gender-specific barriers facing women entrepreneurs, women's productive use of sustainable energy, and women's involvement and leadership in gender-sensitive energy policy-making. To realize this objective, the Programme focuses on six key outcomes, namely: (1) developing a comprehensive roadmap for each focus country based on contextualization of the generic theory to the local environment; (2) engendering energy planning and policies; (3) removing skills, information and social norm barriers; (4) increasing access to finance; (5) promoting time saving and productive uses of energy; and (6) integrating coordination and knowledge management. Strengthening the capacities of national and local governments, women's cooperatives and associations and women entrepreneurs themselves is a priority focus across all areas.

Each of the six outcomes and their constituting outputs are briefly described below. The full theory of change (TOC) underlying this logical framework is given in annex II. The TOC was presented during the joint IRENA, European Commission, and UN Women "Women in Renewable Energy Conference" (Brussels, June 2015) and further refined at the UN Women/UNEP Stakeholder Consultation Workshop on "Women's Sustainable Energy Entrepreneurship and Access" involving the six focus countries (New York, November 16-20, 2015).

The Programme responds directly to the Corporate Thematic Evaluation of UN Women's Contribution to Women's Economic Empowerment. The Evaluation recommended that UN Women's work on women's economic empowerment be explicitly based on, and guided by, a rights-based approach. As such, the Programme is fully aligned with key global normative and policy frameworks, *inter alia*, the right to an adequate standard of living enshrined in Article 25 of the Universal Declaration of Human Rights (UDHR) and Article 11 of the International Covenant on Economic, Social and Cultural Rights; the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), particularly Article 14 (h): "To enjoy adequate living conditions, particularly in relation to housing, sanitation, electricity and water supply, transport and communications"; and the Beijing Platform for Action, notably paragraph 256 (k): "Support the development of women's equal access to housing infrastructure, safe water, and sustainable and affordable energy technologies, such as wind, solar, biomass and other renewable sources, through participatory needs assessments, energy planning and policy

[62] REN21 2015: 10 year report
[63] REN21 2015: 10 year report.

formulation at the local and national levels." As mentioned, the Programme will also directly contribute to the achievement of SDG5, Achieve gender equality and empower all women and girls, and SDG 7, Ensure access to affordable, reliable, sustainable and modern energy for all, which in turn facilitate reaching ten other SDGs as well as Sustainable Energy for All (SE4ALL) objectives.

Finally, the Programme's strategic approach is anchored on national ownership and alignment with national priorities. The interventions introduced by Programme integrate a gender dimension in ongoing and prospective national market transformation efforts. This means that the Programme is fully connected to, and embedded within a broader national development strategy, which ensures the sustainability of the Programme's interventions.

Outcome 1: Comprehensive roadmap developed for each programme country based on contextualization of the generic theory of change to the local environment

The generic theory of change underlying this Programme will need to be thoroughly contextualized to capture the specific needs, risks, ongoing activities, and gaps in each focus country. Through this localization process, partners will be able to reach a shared understanding of underlying barriers to women's engagement in decentralized sustainable energy access and the country specific actions required to address them. It is expected that each country will implement a sub-set of activities in the generic theory of change. The country specific baseline and targets for outcome indicators 2 to 5 will also be determined during the roadmap formulation process through multi-stakeholder consultations. Similarly, the roadmap will inform the development of a detailed budget and resource mobilization strategy to supplement the budget of the Global Programme in each country.

First, a multi-stakeholder situation analysis will be conducted in each focus country (output 1.1). This entails a gender-sensitive examination of existing market opportunities and energy plans and policies; conducting a partnership analysis to identify ongoing activities and stakeholders, including the banking sector ("who is doing what, where"); and identifying the role of women in the sustainable energy sector. In addition, detailed data-collection will take place during this situation analysis. Data will be consolidated based on a common methodology.

Second, the existing gender-specific barriers and risks facing women entrepreneurs will be identified within the following 9 risk categories: power market risk; social acceptance risk; technology sourcing risk; labour input risk; developer risk; financing risk; payment and credit risk; currency risk; and sovereign risk. This will enable each country to identify the specific policy instruments and most appropriate technologies required to address gender differentiated risks and leverage opportunities for women entrepreneurs (output 1.2).

Third, a menu of potential public policy instruments will be identified to address these gender differentiated risks and barriers (output 1.3). Such instruments may include targets and quotas for licensing non-incumbent women entrepreneurs; technical and business trainings for women; raising awareness with local financial institutions; economic incentives for financial institutions to finance women entrepreneurs; and improving women entrepreneurs' access to recourse

mechanisms and remedial measures for contract non-compliance. The most appropriate technologies for household and productive use will also be determined. The Programme will then identify possible partnerships to support a transformative effort to promote women entrepreneurs to accelerate sustainable energy access through decentralized solutions and to increase women's leadership in the energy sector (output 1.4). This will include identification of potential sources of finance as well as nationally appropriate implementation and institutional arrangements.

Outcome 2: Energy planning and policies are gender-inclusive, participatory and responsive

Actors involved in planning and policy making tend to benefit from policies and investments because they can ensure reflection of their interests. Women's involvement in energy planning and policy formulation, including in decision-making, is therefore a pre-condition for addressing gender-differentiated risks and improving their role as energy entrepreneurs. Capacity development initiatives will be required for both women's organizations and policy makers to improve their understanding of the importance of gender-responsive energy policies and of including women in energy policy decision-making processes. This includes increasing awareness of the benefits and costs of different technological options in terms of time savings and productive uses of energy; as well as the consequences of different policy instruments in terms of targeted support to women entrepreneurs. Women's organizations will need to be linked to energy policy makers and the policy-making process (output 2.1).

Participation by women and gender-sensitive assessments do not by themselves ensure the adoption of gender-sensitive and responsive policies. Successfully engendered energy policies must recognize women's gender-specific needs and translate these insights into targeted policies to support women's economic empowerment in the decentralized SET sector (output 2.2). For example, minimum quotas or targets for women in leadership positions in the SET sector may be adopted as a temporary measure. Energy policy making must be coordinated and linked with policies for education, health, social protection, labour, land tenure reforms, civil registration and access to justice to address gender specific risks as the removal of the underlying gender specific structural barriers fall under the purview of other ministries. Based on the assessments conducted to localize the theory of change in each country, targeted public policy instruments to support women entrepreneurs in the SE sector will be championed and incorporated into energy and other relevant sectoral plans and policies.

In addition, policy engagement should ensure that adequate budgetary resources are allocated to concerned public departments, contractors, and local communities to finance the implementation of the gender responsive energy policies. Implementation of energy plans and policies should also be monitored and evaluated to assess the different policy impacts for men and women and educate future market transformation efforts (output 2.3). This will involve collecting statistics disaggregated by gender and evaluating the gender differentiated impact of the policies over time.

Outcome 3: Skill, information and social norm barriers for women SE entrepreneurs are removed and equal opportunities are created for decent employment in the SE sector

In order to ensure that women can take advantage of gender-responsive energy policies, efforts will be required to both improve women's access to technical education, training and information on SETs, as well as to remove harmful social norms and practices affecting their occupational choices. This includes: encouraging greater participation by women in the STEM educational fields; promoting initiatives that encourage women to seek careers in the SET fields through targeted technical trainings, scholarships, internships, and academic and industry research (output 3.1).

In addition to technical skills, enhancing women's entrepreneurial skills through training on business models, business plan development, procurement, marketing, financial management, legal frameworks, existing remedial recourse mechanisms in case of contractual breaches, alternative supply chains, and land titling arrangements will be required. These capacity development efforts could be supplemented by the provision of apprenticeship, mentoring and dedicated business incubation services (output 3.2). Shifting women's perception of suitable gender roles and increasing awareness of their rights may be necessary to promote their engagement in the strongest links of the SET supply chain such as marketing, installation and receivable management. Supply chains and working modalities might have to be adjusted to prevent the risk of violence against women. Public campaigns might also be needed to challenge harmful social norms.

In terms of renewable energy and energy efficiency companies/social enterprises, it is critical for business policies and practices to promote safe and bias-free working environments that attract, retain and promote women. This will include family friendly policies and childcare; addressing workplace harassment and perceptions of women as 'unfit or not suitable' for employment in engineering, technical or business fields. Engagement with the private sector through advocacy, skill development and voluntary compacts could be explored to complement mandatory instruments such as anti-discriminatory regulations and quotas, or financial incentives such as tax breaks (output 3.3).

Outcome 4: Access to finance for women is increased

Appropriate financial mechanisms are essential to facilitate access to upfront capital and manage receivable. Access to affordable finance and new financing models adapted to the cash flow profile of poor households can help the energy poor to offset the high, upfront costs of energy technologies and become key enablers for scaling up deployment of clean energy. New financing solutions are also needed to channel finance to energy access solutions that have not yet attracted commercial investment and which can benefit communities where women are most in need of energy services.

A wide range of traditional and innovative options exist to develop financial mechanisms that are tailored to local contexts and that strengthen financial services to women sustainable energy entrepreneurs. Such options are increasingly being offered by a diverse range of public and private institutions (output 4.1). Some countries have relied on directed credit to achieve public policy goals (lending quotas to SMEs), while others have relied on policy-driven institutions such as national development banks, national green funds and public-sector revolving fund credit schemes to lend directly to project proponents. Others are experimenting with credit enhancement mechanisms, such as partial loan guarantees, to increase the level of consumer credits through

commercial banks or SE technology and service suppliers. Furthermore, micro-finance institutions (MFIs) are diversifying their financial products and increasingly provide consumption loans to enable the poor to meet the upfront costs of SETs. Local cooperatives are also playing the role of micro-finance institutions in the agricultural sector by securing from financial institution and providing financing to farmers for SETs. Similarly, state utilities are able to negotiate better terms for loans from banks or private SE suppliers to install and maintain decentralized SE equipment, which are paid back by customers through their utility bills.

UNEP will draw on best practices and lessons learned from more than two decades of sustainable energy finance experience worldwide. More specifically, lessons from it's successful Prosol programme and African Rural Energy Enterprise Development (AREED) projects will be integrated. The Prosol programme is a joint effort of the Tunisian Ministry of Industry, Energy and Small and Middle Size Enterprises, the National Agency for Energy Conservation of Tunisia, and UNEP. It contributed significantly to the ongoing national transition of fossil fuel-run household water heaters to solar water heaters. To cover high upfront finance in the absence of consumer credit, an innovative finance mechanism was developed which provided targeted subsidies and ensured that a state utility acted as debt collector, enforcer and guarantor. While international development cooperation kicked off the projects, due to success, local authorities took over the programme. The Prosol example shows how a country can build up supply and demand for new renewable energy technologies despite heavy fossil fuel subsidies through subsidizing upfront investment. It further highlights the important role state utilities can have in facilitating finance of renewable energy technologies.

The AREED project offered enterprise developing services and start-up financing for SMEs in the field of sustainable energy in five African countries. Returning capital was invested in new enterprises. Lessons learned from this programme include the importance of financial and institutional barrier removal, increased local ownership for sustainability, and involvement of micro-finance institutions from the start.

More recently, web-based platforms have been developed to link diaspora investors to decentralized entrepreneurs. Using chain block technologies, these web-based platforms provide both access to low cost upfront capital and a financial identity to users, enabling them to build robust credit scores.

Based on the assessment of existing financial intermediation options, capacity development can be provided to local commercial banks and MFIs alongside national stakeholders, to design and manage new credit products with longer maturities, as well as to appraise clean energy loans for women SE entrepreneurs (output 4.2). Partnerships can also be developed with multilateral, regional and national development finance institutions to provide credit lines and credit enhancement instruments to local financial institutions to support these efforts.

Innovative financial solutions will also be required to meet the unique requirements of women SE entrepreneurs. Challenge Funds have proven effective instruments to incentivize the private sector to try new ways of extending financial services to the poor. For example, a grant from the DFID's Financial Deepening Challenge Fund helped Vodafone and Safaricom develop M-PESA, the

mobile telephony-based commercial platform that piloted mobile banking technologies in developing markets (output 4.3).

The Programme and the Africa Enterprise Challenge Fund (AECF) are partnering to leverage the unique capacities of women entrepreneurs to accelerate universal sustainable energy access in Africa. The partnership brings together elements of this Programme with the "Renewable Energy and Adaptation to Climate Technologies" (REACT) programme window of AECF. A gender sensitive REACT window will provide investment support to the private sector for new and innovative ideas in financial intermediation services, energy service delivery and business models for women entrepreneurs and customers to accelerate universal sustainable energy solutions. The challenge fund will initially target an investment of up to $10 million in Senegal and Morocco. Funding for the challenge fund will take place in parallel.[64]

The collaboration builds on the comparative advantages of each organisation. The AECF is well positioned to provide early-stage financing to innovative and commercially sustainable business ideas that can positively impact the incomes and living standards of poor households, and which develop and use affordable and accessible technologies. The Programme will complement this by promoting an equal playing-field for women-led energy firms through an integrated approach that addresses multiple barriers to women's participation in the sector, including: the policy environment for energy access; skill and social norm barriers for women entrepreneurs; increased access to finance for women entrepreneurs; and the promotion of productive uses of energy. A full concept note can be found in Annex 4.

Outcome 5: Women's productive use of SET is promoted, and time dedicated to unpaid care and domestic work is reduced

In every country and region of the world, women perform the majority of unpaid care work – and work longer hours than men overall. The 2012 World Development Report found that globally women devote 1 to 3 hours more a day to housework than men; 2 to 10 times the amount of time a day to care (of children, elderly, and the sick), and 1 to 4 hours less a day to market activities.[65] Access to affordable sustainable energy can dramatically reduce the time that women spend on domestic work (cooking, food preparation, cleaning, washing clothes, water and fuel collection), and on direct care (of children, older persons, the ill and disabled). This would free up their time for productive activities. A number of studies have shown that electrification of rural communities have resulted in a 9 percentage point increase in female employment, with no comparable increase in male employment. The studies attribute this largely to the fact that electricity frees up women's time by increasing the efficiency of domestic chores.[66]

However, sustainable energy availability does not automatically result into sustainable energy access and does not reduce poverty by itself. It must first be translated into specific services that reduce the time spent on unpaid care work, enhance the productivity of existing livelihoods and promote new income generating activities. There is some empirical evidence that benefits from energy availability tend to accrue in a regressive manner, with wealthier households receiving a

[64] That is, the $10 million has not been included in the budget of this Programme.
[65] Gender and Development Network, 2014: Brief: Unpaid care – A priority for the post 2015 development goals and beyond
[66] Kohlin; Silles; Pattanayak et al, 2011. Energy, gender and development.

higher boost of income than poorer households. Thus, it is critical to couple renewable energy access with other development interventions that promote income and employment generation for women.

As a first step, access to energy must be coupled with electrification of health centres, schools and water supply systems (output 5.1). These services are key economic and women's advancement enablers. For example, people often cannot start economic activities or cease activities they have started due to the health problems of family members leading to the family's resources being used to cover treatment costs. Furthermore, when family members are sick or children cannot attend school, the burden of care falls disproportionately on women and girls, reducing the time available for developing and running an income generating business. Ensuring that school, health centers and water supply systems are electrified is a pre-condition to address the energy poverty of women and enable them to seize new income opportunities created by sustainable energy access. As mentioned under outcome 2 (gender responsive energy policies), separate ministries typically look after energy matters, health, education and water. Promoting interaction among these different stakeholders can help formulate solutions that look at the entire ecosystem. To this end, the Programme could support the government to bring together representatives from these sectors with, energy, planning and finance ministries in order to develop action plans to improve energy service provision in these areas. Gender-responsive budgeting can also be promoted to ensure resources are allocated to increase access of sustainable energy solutions in health, education, and water supply. Options to encourage schools, health centers and water supply to source their SETs from women entrepreneurs may be explored. This could provide women entrepreneurs with 'anchor clients' – i.e. clients that provide a regular source of revenue, which will be extremely valuable in increasing their access to finance. Innovative financial platforms integrating different service providers could also be piloted.

Promoting the productive use of energy access could be particularly effective in the agricultural sector, where women are disproportionally represented (output 5.2). Land preparation, planting and replanting, weed control, harvesting and processing are mostly powered by human labor in sub-Saharan Africa and elsewhere. A recent study found that labor shortage is a major determinant of the gender agricultural productivity gap in several Africa countries. Energy access could alleviate this labor shortage and substantially close the gender productivity gap that can exceed 20% in sub-Saharan countries.[67] In Morocco, UN Women and partners are supporting women to generate an income by using renewable energy to cultivate medicinal and aromatic plants, increasing their income, consumption and investment capacity. The economic returns from these activities greatly exceed the initial investment and generate substantial co-benefits in terms of women's empowerment, climate resilience, biodiversity conservation, and desertification abatement.

Improved agricultural productivity can free some labour and also enable women to turn towards employment in other productive and service sectors. SMEs account for around 60 percent of employment in developing countries.[68] Although larger, the energy needs of micro and small enterprises in these sectors are relatively similar to those of households. Energy access can enable

[67] UN Women, the World Bank, UNEP and UNDP (2015). Gender gap in agricultural productivity in Malawi, Tanzania and Uganda.
[68] Bacchetta et al, 2009

enterprises to remain open longer hours, increase hourly productivity through automation (sewing machines, etc.) and reduce losses (refrigeration, etc.). Promoting the productive use of energy in SMEs (output 5.3) can leverage progress made in terms of strengthening financial intermediation services for SE entrepreneurs. Based on in-depth studies of economic trends at the national and local levels, targeted vocational and business development training could be extended to prospective micro-entrepreneurs. It would reduce the risk for MFIs and commercial banks to provide SME loans to new entrepreneurs and alleviate the fear of prospective clients to take a start-up loan. Enabling legislation that promotes energy access for such micro enterprises could also be a part of energy policies.

Outcome 6: Integrated coordination and data driven knowledge management promoted.

Achieving the Programme's goals will require an integrated approach that coordinates and links women entrepreneurs to a wide range of stakeholders and resources necessary to successfully launch and scale up their LSEE ventures. It will also require addressing the data gap related to women's energy access and women as entrepreneurs and employees specifically in the sustainable energy sector. While the disproportionate effects of energy poverty on women have been well documented, there is little data and even fewer data-driven insights on the comparative advantage of women SE entrepreneurs. Evidence is mostly anecdotal in this area. Gathering data to empirically measure the value of women's comparative advantage will require data capture across the business value chain.

Hence, as part of its broader women's empowerment programme, UN Women has designed "WomenPower^{TM}", an integrated cloud-based platform that links women entrepreneurs with information, debt and equity finance, quality-assured goods and service suppliers, customers, leads, and markets. The platform will address the data gap by collecting first-of-its-kind gender-disaggregated data on energy access and entrepreneurship. Contributing partners can view key performance indicators in real-time to monitor the progress of the Programme. This will provide solid evidence to evaluate the impact of different gender-responsive market transformation strategies. In addition to the data and M&E benefits, the platform will support the overall implementation of the Programme.

The Platform will be deployed in a phased manner. Using off-the-shelf software solutions, the minimum features for a viable product (MVP) will be piloted for 10 entrepreneurs in each of the 6 participating countries (output 6.1). During this phase, the Platform will provide bridging services. The MVP phase will produce a knowledge product to enable a 'franchise-like' approach to lower marginal costs of expansion, including training material that covers all functional areas of running a business and data capture. See Annex 5 for a concept note on the MVP.

Based on the results of the MVP, a full product will be fine-tuned and rolled out using either a dedicated software solution or a bundle of existing tools (output 6.2). In this phase, the platform will allow evidence-based research around women's empowerment, sustainable energy access, and the nexus between these two issue areas through systematic data collection and analysis. Through its partnerships and knowledge platform, the Programme will generate data-driven insights to inform energy access efforts and influence the work of others to accelerate the transition to sustainable energy access in the six focus countries and beyond. Suitable institutional

arrangements will be explored at the onset of the Programme to ensure that these data collection efforts are sustained after the project. Should the Platform consider exploring innovative sources of finance, a dedicated study will be undertaken to examine the legal implications. A similar legal study will be undertaken should the Platform move towards a full cost-recovery model,

In order to transform raw data into actionable insights, codify and share insights and experiences across countries and stakeholders, the Programme will promote regular knowledge exchange and produce knowledge products. This will include South-South cooperation between the countries, as well as bi-annual symposiums. The Programme will publish knowledge products, including peer-reviewed articles, policy briefings, reports, etc and create a community of practice around the issue of women's empowerment and sustainable energy (output 6.3).

Programme Logframe

Strategic Statements	Indicators	Baseline	Target	Means of Verification
Programme Goal: Women's entrepreneurship and leadership accelerates universal sustainable energy access	• **% of population with electricity access (SDG 7.1) sex disaggregated;** • **% of population with primary reliance on non-solid fuels (SDG 7.1) sex disaggregated;** • **% of renewable energy share in the final energy consumption (SDG 7.2).**			**SDG database**
FORMULATION				
Outcome 1: Comprehensive roadmap developed and adopted by national partners for each country based on contextualization of the generic theory of change (including country indicators, baselines and targets)	• # of comprehensive roadmaps developed and adopted, with localized theories of change and country specific indicators, baselines and targets	0	6	Project reports
Outputs 1.1: Multi-stakeholder situation analysis conducted in each country and baseline data consolidated using a common methodology	• # of situation analysis undertaken • Consolidated data set in place	0 No	6 Yes	Project reports
Output 1.2: Gender-specific market transformation risk analysis conducted	• # of gender-responsive market transformation risk analysis undertaken	0	6	Project reports
Output 1.3. Specific strategies to address gender specific barriers and complement ongoing market transformation efforts are developed (including policy instruments and technologies)	• # of specific policy instruments identified	0	6	Project reports
Output 1.4. Appropriate implementation, institutional and financing modalities developed.	• Have implementation partners (public and private institutions), sources of finance and national institutional arrangements been identified? (Y/N)	0	6	Project reports
IMPLEMENTATION[69]				

[69] Baseline and target data for outcomes 2, 3 and 4 will be determined during the situation analysis and data collection phase.

Outcome 2: Energy planning and policy development is gender inclusive, participatory and responsive	• Adoption of targets in energy plans/policies on women's production and use of energy (Y/N). • % change in budget allocations to implementation of gender-responsive energy plans			• Surveys of national energy ministries/agencies • Project reports
Output 2.1: Improved capacity of women's associations and policy makers to understand gender-responsive energy policies and effectively engage in planning and policy development	• # of women's associations and policy makers who report a better understanding of gender-responsive energy policies • Number of engagements by women stakeholders in the energy planning and policy development process			
Output 2.2: Targeted gender-responsive SE instruments are identified and proposed for incorporation into energy policies and for coordination with other relevant sectoral plans.	• Number of policy instrument packages developed • Has energy policy making been linked with other sectors (Y/N)			
Output 2.3: Increased national capacity to adequately finance, implement, monitor and evaluate gender sensitive provisions of energy policies.	• # of tools and/or methodologies shared with governments on financing, implementing and M&E of gender sensitive provisions			
Outcome 3: Skills, information and social norms barriers are removed and equal opportunities are created for women's decent employment in the SE sector	• % distribution of tertiary graduates by sex and field of study; • % change in SET firms with female participation in ownership or top management			• UNESCO UIS • World Bank • Enterprise Surveys
Output 3.1: Women's technical capacities and access to information in SET are increased.	• # of women entrepreneurs who report an increase in technical skills in SET			
Output 3.2: Women's entrepreneurial skills and business capacities in the SE sector are enhanced	• # of business licenses granted to women entrepreneurs in the energy sector			
Output 3.3: Technical supported provided to increase access to safe, bias-free working environments that attract, retain and promote women	• # of SE companies with family friendly policies			

Outcome 4: Access to finance for sustainable energy is increased for women	• % change of women-owned enterprises identifying assess to finance as a major constraint; • # of new financial products designed to meet the unique requirements of women entrepreneurs			
Output 4.1: Traditional and innovative sources of finance, financing instruments, and public/private financing models are identified and explored.	• Options for traditional and innovation financing identified			
Output 4.2: Improved access to upfront capital through concessionary financing for women from MFIs, DFIs and commercial banks	• # of loans provided to women SE entrepreneurs • # of loan officers that report a better understanding of appraising SE projects for women SE entrepreneurs			
Output 4.3: Innovative financial solutions for women entrepreneurs and customers are developed and/scaled up	• Amount mobilized for women entrepreneurs through innovative financing mechanisms (USD) • Has a challenge fund for women entrepreneurs been successfully launched (Y/N)			
Outcome 5: Women's productive use of sustainable energy is promoted and time dedicated to unpaid care and domestic work is reduced	• % of schools (SDG 4a) and health centers with access to electricity; • Average weekly hours spent on unpaid domestic and care work by sex, age, and location (SDG 5.4) • % change in income of target women farmers or SMEs.			• SDG database, WHO Service Availability and Readiness Assessment (SARA) • SDG database • National database
Output 5.1: Improved capacity for national partners to deploy SETs to health centers, schools and water supply systems	• # of tools and/or methodologies shared with governments to increase deployment of SETs to schools, health centers and/or water supply systems			
Output 5.2: Improved capacity of women farmers to use SE technologies to address labor shortage and increase agricultural productivity	• # of women that report an increase in capacity to use SETs productively • Time reported saved by women farmers as a result of SET			

Output 5.3: Improved capacity of women to use SE technologies to start-up/scale up micro and medium enterprises	• # of women that report an increase in capacity to use SETs productively • Time reported saved by women farmers as a result of SET			
PARTNERSHIP BUILDING & KNOWLEDGE MANAGEMENT				
Outcome 6: Integrated knowledge and evidence base around women's empowerment and sustainable energy access strengthened	• # of self-starter countries			Project report
Output 6.1: Initial phase of WomenPower launched in 6 focus countries	• Has WomenPower been launched in 6 countries (Y/N)			
Output 6.2: WomenPower scaled up in 6 focus countries	• # of women entrepreneurs connected through WomenPower			
Output 6.3: Coordination and data driven knowledge management promoted	• Second stakeholder workshop held (Y/N) • # of publications • Has a community of practice been created (Y/N)			

4. Partnerships & Institutional Arrangement

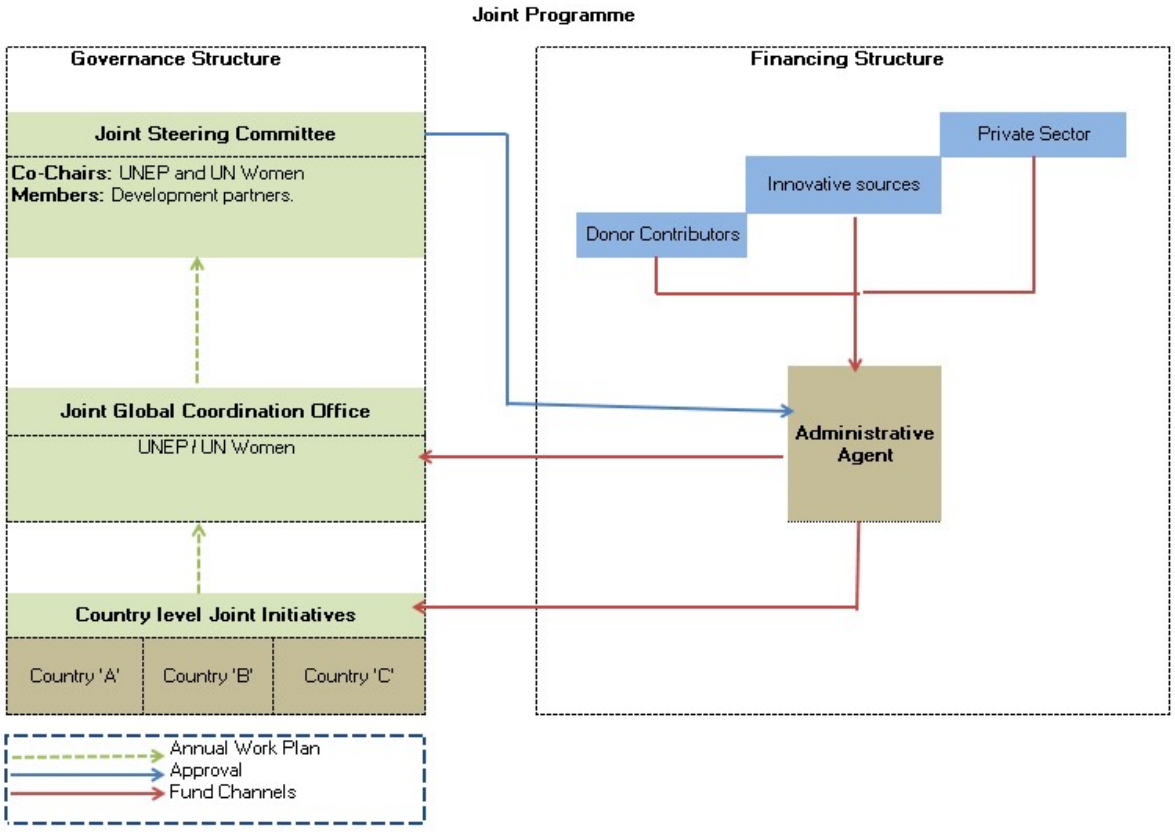
UN Women and UNEP have joined forces through this Joint Programme as the leading environmental and gender equality agencies within the United Nations system. The Programme brings together the comparative advantages of each organization. It will leverage UNEP's experience and expertise, notably within the areas of energy policies, technologies and finance. Similarly, it will benefit from UN Women experience in promoting and collecting evidence on women's economic empowerment, notably by engendering policies, addressing skills and social norm barriers, and strengthening women's productive capacities. The lead agency by output and main activity is provided in the budget. The Programme will also leverage UNEP's expertise at the regional level as well as UN Women's operational capacity in each of the six countries.

Further, through the contextualization process of the theory of change in each participating country, key strategic partnerships with other stakeholders will be identified and developed to address outcomes 2 to 5. Notably, the Programme will partner with implementing agencies from the Global Environment Facility and the Green Climate Fund, supporting market transformation efforts for sustainable energy at the country level. In addition to UN Women and UNEP, this could include the World Bank, the Regional Development Banks, UNDP, UNIDO, the UNFCCC and other multilateral and bilateral agencies. UN Women and UNEP are also exploring collaboration with experienced civil society partners and networks, including the Global Alliance for Clean Cookstoves, Energia and ENDA. The Programme will also reach out to key bilateral institutions engaged in similar efforts. For outcome 4 on enhancing financial intermediation services, relationships will be developed at the Programme level with development banks, challenge funds and new ICT-based financial service providers. These relationships could be formalized through the establishment of dedicated gender windows within existing challenge funds or credit lines by development finance institutions.

National governments, including ministries of energy, environment, social affairs and international development and national women's machinery will be key counterparts in the implementation of the programme. Furthermore, partnership and collaboration will be sought with NGOs and women-led civil society networks at both regional and national levels to implement activities at the community level. Partnerships with the private sectors will be established, in particular for outcome areas 3 and 5. This will include national and multi-national companies, who can support in business development, trade, and job creation.

The Programme will operate through a joint fund management arrangement in line with UNDG Joint Programming Guidance and informed by the joint evaluation on joint programmes on gender equality in the UN system. As a UN inter-agency pass-through mechanism, the Global Programme offers a flexible mechanism that can receive contributions from multiple financial partners, while enabling UN Women and UNEP to handle implementation according to their own operating procedures. By avoiding any duplication of operating procedures, the Global Programme will minimize implementation delays and transaction costs. Recognizing that it is difficult for some financial partners to contribute to pooled funding mechanisms, the Programme will also seek complementary funding through parallel funding to both UN Women and UNEP. UN Women will play the role of convening agency.

The figure below sets out the institutional and financing arrangements.



The coordination and management of the programme will be conducted at three levels:

Steering Committee – Global level
At the global level, an inclusive Steering Committee will be co-chaired by the UNEP and UN Women Deputy Executive Directors responsible for Programme. The three largest financial contributors to the Programme will be invited as members to the Steering Committee at the global level. National governments will form part of the steering arrangements at country level

The main responsibilities of the global Steering Committee are to:

- Provide a platform for partnership, coordination and advocacy.
- Approve country allocations on the basis of the Programme's expected results, available funding, allocation criteria and country annual work-plans.
- Review implementation status and provide oversight to ensure achievement of results.
- Approve the Programme's risk management strategy and review risk monitoring regularly.
- Review and approve the periodic progress reports.
- Commission mid-term and final independent evaluations on the overall performance of the Programme.

- Approve direct costs related to operations support by the Global Coordination Unit.
- Approve Programme extensions and updates to the Programme document, as required.
- Mobilize resources and manage donor relations.
- Commission lessons learned or development of knowledge products.
- Provide quality assurance of knowledge products.

The Steering Committee will adopt its own rules of procedures. It meets at least twice a year and makes funding decisions by consensus.

Joint Global Coordination Office
The role of the Coordination Office is to:

- Support global activities and country level coordination mechanisms with development and implementation of their roadmaps, including by:
    - liaising with UNEP headquarters, technical divisions and regional offices and UN Women headquarters, regional and country offices;
    - identifying consultants;
    - preparing terms of references;
    - reviewing country strategies and roadmaps before submission to the Steering Committee etc.
- Provide logistical and operational support to the Steering Committee.
- Review country requests for funding, ensuring their conformity with the requirements of the Programme Document and results framework.
- Ensure the monitoring of the operational risks and performance.
- Consolidate annual and final narrative reports provided by country-level mechanisms and share with the Steering Committee for review as well as with Administrative Agent for preparation of consolidated narrative and financial reports.
- Facilitate collaboration and communication between the Steering Committee, country level mechanisms, and implementing entities to ensure interventions are implemented effectively.
- Liaise with the Administrative Agent on fund administration issues, including issues related to project/ fund extensions and project/fund closure.
- Coordinates programme communication and outreach activities and facilitates programme-wide knowledge management.

Country Level Management Mechanisms / Project Board
At country level, national mechanisms / project boards will be identified to manage programme implementation in the six countries. To the extent possible, existing structures will be used rather than establishing new ones (e.g. existing project management units in ministries of renewable energy, ministries of environment, and similar structures). It is envisaged that country level mechanisms will be co-chaired by the Ministry in charge of energy and representatives of UN Women and UNEP. Representatives from the Ministry in Charge of Gender and other relevant government entities involved in the programme implementation will also be included. UNEP regional offices and UN Women Country Offices will also play a significant role if required. Each country roadmap will elaborate on the country-level management mechanism to be used.

The main responsibilities of the country level management mechanism include:

- Ensuring that the deliverables highlighted above are completed on time, on scope and within budget.
- Liaising with the Global Coordination Office for support needs and share deliverables for technical review.
- Monitoring progress, preparing and consolidating narrative reports from partners at country/regional level.
- Identifying and maintain strategic partners.
- Mobilizing resources at country level.
- Ensuring knowledge management, outreach and awareness activities.

Administrative Agent

The Programme will be administered by the UNDP MPTF Office, acting as the Administrative Agent. The UNDP Multi-Partner Trust Fund Office is a UN Facility which administers over 100 UN common funding instruments (http://mptf.undp.org).

Description of the responsibilities of the Administrative Agent, as per UNDG "Protocol on the Administrative Agent for Multi-Donor Trust Funds and Joint Programmes, and One UN Funds". The AA will be entitled to allocate an administrative fee of one percent (1%) of the amount contributed by each donor, to meet the costs of performing the AA's standard functions as described in the MOU.

The standard functions include:

- Receipt, administration, and disbursement of funds to the participating organizations according to the instructions of the Steering Committee.
- Financial reporting and consolidation.

The Administrative Agent will conclude a Memorandum of Understanding (MOU) with the Participating UN Organisations and Standard Administrative Arrangements (SAAs) with contributing partners.[70] The Administrative Agent will disburse funds to the Global Coordination Unit for direct costs based on the decision of the Steering Committee. On an annual basis, the Administrative Agent will notify the Steering Committee of the amounts used for such purposes.

At the country level it is envisaged that the UN Women portion of funding will be implemented through a national implementation modality. This will further strengthen national ownership. In some countries, UN Women may begin with direct implementation with a view to moving towards national implementation within 2 to 3 years.

[70] These agreements are approved by the UNDG and can be found at http://mptf.undp.org.

5. Budget

In line with the implementation strategy's emphasis on partnerships and knowledge sharing, the Global Programme will provide seed funding to the six countries to leverage the required co-financing (in cash or kind) from the government, private sector, and international bi-lateral institutions. The Programme aims at a leveraging ratio of 1:3, providing on average $5 million per country over the period. Countries will use the roadmaps to mobilize the additional co-financing required at the country level.

A detailed indicative results-based budget is shown below. Not all outcomes and outputs will be implemented in all countries. Country roadmaps will detail country-specific budgets and financing sources.

Budget[71]

Goal: Women's entrepreneurship and leadership accelerates universal sustainable energy access										
Outcomes	**Outputs**	**Indicative Activities**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**		**Responsible Agency**
1. Comprehensive roadmap developed and adopted by national partners for each country based on a contextualization of the generic theory of change	**1.1:** Multi-stakeholder situation analysis conducted in each country and baseline data consolidated using a common methodology	Gender-sensitive review of existing market opportunities, energy plans/policies and the role and needs of women in sustainable energy	120,000	0	0	0	0	**120,000**		**UN Women**
		Development of baseline data methodology	30,000	0	0	0	0	**30,000**		**UN Women**
		Baseline data collection (sex-disaggregated)	240,000	0	0	0	0	**240,000**		**UN Women**
	1.2: Gender-specific market transformation risk analysis conducted	Identify gender-sensitive risks and barriers in terms of access to finance and technologies identif	480,000	0	0	0	0	**480,000**		**UNEP**
		Identify gender-sensitive risks and barriers in terms access to skills, time, justice etc.	120,000	0	0	0	0	**120,000**		**UN Women**
	1.3 Specific strategies to address gender specific barriers and complement ongoing market transformation efforts are developed (including policy instruments and technologies)	Identify appropriate technologies for household and productive use	180,000	0	0	0	0	**180,000**		**UNEP**
		Identify appropriate policy instruments	480,000	0	0	0	0	**480,000**		**UNEP**
	1.4. Appropriate implementation, institutional and financing modalities developed	Identify and assess implementing partners and determine appropriate national institutional arrangements	120,000	0	0	0	0	**120,000**		**UN Women**
		Identify and engage potential sources of finance for programme implementation	60,000	0	0	0	0	**60,000**		**UNEP**
			60,000	0	0	0	0	**60,000**		**UN Women**
Sub-total outcome 1								**1,890,000**		**1,200,000**
										690,000
2. Energy planning and policy development is gender inclusive, participatory and responsive	**2.1:** Improved capacity of women's associations and policy makers to understand gender-responsive energy policies and effectively engage in planning and policy	Advocacy / Mobilization of women's organizations & policy makers (male and female)	120,000	120,000	60,000	60,000	60,000	**420,000**		**UN Women**
		Technical support to national women associations	200,000	60,000	60,000	60,000	60,000	**440,000**		**UNEP**
	2.2. Targeted gender-responsive SE instruments are identified and proposed for incorporation into energy policies and for coordination with other relevant sectoral plans.	Technical support for policy reform	150,000	240,000	240,000	120,000	120,000	**870,000**		**UNEP**
		Dialogue between women's organizations with policy makers and involvement in drafting committees	0	60,000	60,000	0	0	**120,000**		**UN Women**
		Dialogue between energy sector with other ministries (education, health etc.)	0	30,000	30,000			**60,000**		**UN Women**
				30,000	30,000	0	0	**60,000**		**UNEP**
	2.3 Increased national capacity to adequately finance, implement, monitor and evaluate gender sensitive provisions of energy policies.	Technical support for budgetary appropriation (including gender responsive budgeting) and M&E		60,000	60,000	60,000	60,000	**240,000**		**UN Women**
Sub-total outcome 2								**2,210,000**		**1,370,000**
										840,000

[71] Note, budget figures for outcomes two to five are estimates and will be finalized in each country roadmap.

3. Skills, information and social norm barriers removed and equal opportunities created for women's decent employment in the SE sector	**3.1.** Women's technical capacities and access to information in SET are increased.	Capacity development of women's technical SE skills	250,000	400,000	400,000	400,000	120,000	**1,570,000**		**UNEP**
		Address discriminatory social norms and gender stereotypes about women and technology and increase access to information	0	120,000	120,000	60,000	0	**300,000**		**UN Women**
	3.2: Enhanced entrepreneurial and business capacities for women in the SET sector	Provide business skills and entrepreneurial training	0	100,000	240,000	200,000	120,000	**660,000**		**UN Women**
		Provide business incubation services including support to women entrepreneurs to obtain business licenses		120,000	120,000	60,000		**300,000**		**UN Women**
	3.3. Technical supported provided to increase access to safe, bias-free working environments that attract, retain and promote women	Increase remedial measure options for women working in SE enterprises	0	0	60,000	60,000	60,000	**180,000**		**UN Women**
		Promote gender certification of SE companies (family friendly policies, childcare, etc.)	0	0		60,000	60,000	**120,000**		**UN Women**
		Advocacy to change perceptions of suitable occupations for women and added value of women working in SE enterprises	0	0	60,000	60,000	60,000	**180,000**		**UN Women**
Sub-total outcome 3								**3,310,000**		**1,570,000** **1,740,000**
4. Access to finance for sustainable energy is increased for women	**4.1.** Traditional and innovative sources of finance, financing instruments, and public/private financing models are identified and explored	Identify suitable sources for finance, financing instruments and models	176,000	30,000	0	0	0	**206,000**		**UNEP**
		Increase women's access to these sources/instruments/models	0	400,000	300,000	250,000	106,000	**1,056,000**		**UNEP**
	4.2. Improved access to upfront capital through concessionary financing from MFIs, DFIs and commercial banks for women	Identify sources of concessionary financing from DFIs	0	50,000	0	0	0	**50,000**		**UNEP**
		Implement relevant credit enhancements enabling commercial bank lending	0	1,626,000	1,572,000	572,000	0	**3,770,000**		**UNEP**
	4.3. Innovative financial solutions for women entrepreneurs and customers are developed	Identify existing mobile money platforms and MFIs suitable for integration with LSEE model	500,000	500,000	0	0	0	**1,000,000**		**UNEP**
		Identify potential off-takers for accounts receivable risk	50,000	100,000	0	0	0	**150,000**		**UNEP**
Sub-total outcome 4								**6,232,000**		**UNEP**
5. Women's productive use of sustainable energy is increased and time dedicated to unpaid care and domestic work is reduced	**5.1.** Improved capacity for national partners to deploy SETs to health centers, schools and water supply	Gender responsive budgeting to prioritize SE in school, health centres and water supply	0	0	240,000	60,000	0	**300,000**		**UN Women**
		New business models explored	0	0	120,000	60,000	0	**180,000**		**UN Women**
	5.2 Improved capacity of women farmers to use SE technologies to address labor shortage and increase agricultural productivity	Capacity development of women farmers to productively use SET	0	120,000	120,000	0	0	**240,000**		**UN Women**
	5.3 Improved capacity of women to use SE technologies to start-up/scale up micro and medium enterprises	Capacity development of women to increase productive use of SE services in SMEs	0	0	120,000	120,000	0	**240,000**		**UN Women**
Sub-total outcome 5								**960,000**		**UN Women**

6. Integrated knowledge and evidence base around women's empowerment and sustainable energy access strengthened	**6.1:** Launch of WomenPower, an integrated multi-stakeholder platform	Personnel	150,000					**150,000**		**UN Women**
		Software costs	180,000					**180,000**		**UN Women**
		Travel	120,000					**120,000**		**UN Women**
		Equipment/Supplies	60,000					**60,000**		**UN Women**
	6.2: Scale up of WomenPower platform	Operations		500,000	500,000	500,000	500,000	**2,000,000**		**UN Women**
		Software		260,000	260,000	260,000	260,000	**1,040,000**		**UN Women**
		Equipment/supplies		500,000	500,000	500,000	500,000	**2,000,000**		**UN Women**
		Legal, localization		240,000	240,000	240,000	240,000	**960,000**		**UN Women**
	6.3. Coordination and data driven knowledge management promoted	South South cooperation	30,000	30,000	30,000	30,000	30,000	**150,000**		**UN Women**
			30,000	30,000	30,000	30,000	30,000	**150,000**		**UNEP**
		Knowledge management / coordination / dissemination	50,000	50,000	50,000	50,000	100,000	**300,000**		**UN Women**
			30,000	30,000	30,000	30,000	60,000	**180,000**		**UNEP**
		Bi-annual symposiums			100,000			**100,000**		**UN Women**
			100,000				100,000	**200,000**		**UNEP**
Sub-total outcome 6								**7,590,000**		**530,000**
										7,060,000
Global Coordination Unit		Global Project Coordinator	250,000	250,000	250,000	250,000	250,000	**1,250,000**		**UN Women**
		Knowledge Management / Communications	30,000	30,000	30,000	30,000	30,000	**150,000**		**UN Women / UNEP**
		Travel	60,000	60,000	60,000	60,000	60,000	**300,000**		
		Equipment/Supplies	10,000	10,000	10,000	10,000	10,000	**50,000**		
Country-level management		Project Personnel	250,000	250,000	250,000	250,000	250,000	**1,250,000**		**UN Women**
		Equipment/Supplies	50,000	50,000	50,000	50,000	50,000	**250,000**		
		Travel in-country	150,000	150,000	150,000	150,000	150,000	**750,000**		
		Knowledge Management / Communications	150,000	150,000	150,000	150,000	150,000	**750,000**		
Sub-total								**4,750,000**		
Subtotal								**26,942,000**		
M&E, audit, security (3%)								**808,260**		
Indirect costs (7%)								**1,885,940**		
TOTAL								**29,636,200**		

6. Risk Management

The Programme has identified the following key risks and mitigation measures

Risks	Mitigation measures
1. Delays in resource mobilization or failure to mobile the resources required for the Programme	Both UN Women and UNEP senior management are committed to resource mobilization. Outreach has already started with several potential contributing partners. One of the first issues to be discussed by the Steering Committee, will be a resource mobilization strategy
2. The Programme's estimated budget is too conservative and its co-financing assumption ratio of 1 :3 does not materialize	The Programme may consider implementation in a more phased manner to ensure it can adequately finance the activities in each country. Time will also be dedicated during the formulation of the country roadmaps to do a more in-depth analysis of the co-financing opportunities.
3. The underlying theory of change is found not to be true	The benefit of an articulated theory of change is that it enables a rigorous monitoring framework and a proactive change in interventions if required.
4. The structural barriers facing women entrepreneurs are too entrenched to be changed over the duration of the Programme, which prevents the Programme from achieving transformative change.	Even if the Programme is unable to achieve transformative change, it is very likely to achieve incremental change. It will also have filled the current data gap and created an evidence base around engendering market transformation efforts.
5. The initial phase of the integrated Platform (WomenPower) is not viable to be up-scaled	Coordination and knowledge management will take place through a more traditional approach. The initial phase will still have collected the first of its kind data, which will be valuable in defining future interventions.
6. UN Women and UNEP experience challenges in coordinating respective activities given the difference in skill set and operational modalities	The Steering Committee will provide a platform at the senior management level to promote coordination and remedy any issues that arises. The pass-through nature of the joint programme will enable both UN Women and UNEP to implement activities using their own standard operating procedures.

Annex 1: Gender-specific risk analysis[72]

BARRIERS						MENU OF SELECTED PUBLIC INSTRUMENTS		Link to the Theory of Change
						Policy instruments to address gender specific barriers		
Risk Category	Description	Underlying Barriers	Increased probability of occurrence for women	Key Stakeholder Group	Governance Levels	Output	Description	TOC Output
1. Power Market Risk	Risk arising from limitations and uncertainty in the energy market (off- and on-grid) and ability to compete with traditional sources of power	*Market outlook:* Uncertainty regarding national/state-level strategy and targets for renewable energy and electrification	*Gender insensitive market outlook*: Uncertainty and lack of clarity regarding government commitment and capacity to address gender-bias in national/state level strategies for renewable energy and electrification.	Policymakers, legislators, regulators	National, state	Ensure strategies and policies are gender-responsive to address the specific risks affecting women investors	Increase the engagement and decision-making capacity of women in energy planning and policy development	2.1
							Recognize and assess the gender specific needs, risks and underlying barriers; conduct gender analysis/audits of SE policies and make specific gender-responsive policy recommendations	2.1
							Build gender specific policy instruments into energy policies to ensure that they benefit equally women and men. Such policies could include targeted fiscal incentives, streamlined licensing processes and quotas for women SE entrepreneurs, mandatory targets or incentives for the private sector and public utilities to improve the gender balance in the work force; family-friendly and anti-discriminatory work place policies; dedicated avenues to facilitate women SE entrepreneurs' access to justice; and complementary investment in essential social infrastructures to reduce the unpaid domestic and care work of women. Energy policy making must be coordinated with policies for education, social protection, trade, industry, labour, land tenure reforms, civil registration and access to justice to address gender specific risks, since the removal of the underlying gender-specific structural barriers fall under the purview of other ministries.	2.2
							Allocate adequate budgetary resources to finance implementation of gender specific policy instruments and monitor and evaluate their impacts for men and women to educate future market transformation efforts.	2.3
		Market access and competition: Limitations in ability of minigrid developers to access the electrification market. Uncertainty regarding potential future competition in electrification, including from competing operators (minigrid, SHS)	*Women as soft competitive targets:* Gender bias results in women developers being expressly targeted for competition			Ensure regulations concerning market access are gender sensitive.	Targets and quotas for allocating licenses to non-incumbent women mini-grid developers	2.2
		Tariff limitations: Uncertainty or inflexibility in electricity tariff regulations for minigrids, for example via universal tariffs						
		Electricity quality standards: Lack of clarity, uncertainty, and/or inconsistent technical requirements to ensure quality of electricity provided by minigrids						
		Competing subsidies: Competition from subsidized diesel and kerosene power sources; negative perceptions of minigrid tariffs due to subsidized grid-distributed electricity						

[72] The gender neutral components of this table (white boxes) are based on ongoing work by UNDP and ETH Zurich on generic barriers and risks for private sector investment in solar PV/battery mini-grids in developing countries [20]. Orange and green boxes reflect gender sensitive components of the analysis. Red boxes denote negative risks and green boxes denote positive risks for women entrepreneurs. The full paper of this analysis may be found at: http://www.aimspress.com/article/10.3934/energy.2016.1.136

2. Grid Expansion Risk	Risks arising from uncertainty in grid expansion plans and technical regulations for integration into the main grid	*Grid planning:* Uncertainty to minigrid developers' business model and financial viability due to unclear, or lack of, grid planning and expansion policies		Utility, distribution company, utility /grid regulator	National, state, local			
		Technical requirements for grid integration: Uncertain, or lack of, technical standards for mini-grid equipment to ensure compatibility with main grid if integrated						
3. Permits Risk	Risk arising from the public sector's inability to efficiently and transparently administer minigrid-related licensing and permits	*Electricity permitting:* Uncertain costs and time-frames for obtaining licenses and permits from national, state/regional, and/or local administrators for different regimes (power, renewable, electrification, environmental). Insufficient local resources and methods of recourse to enforce exclusivity permits	Women are often perceived as softer targets for corruption when seeking to obtain a license. They can be particularly exposed to this risk in the presence of discriminatory business laws.	Permits administrators	National, state, local	Simplify and streamline license processes	Simplify and streamline license processes to increase transparency and reduce unnecessary burden of business registration on women	2.2
4. Social Acceptance Risk	Risks arising from lack of awareness and resistance to renewable energy and minigrids in communities	Resistance by end users and local communities due to unfamiliarity with electricity and renewable energy sources ; mis-information /perception and lack of awareness for minigrid offerings; resistance from incumbent businesses (e.g., diesel based generation) and users (e.g., SHS), disrupted by minigrids		General public, NGOs, businesses	Local			
5. Technology Sourcing Risk	Risk arising from limitations in the quality and availability of minigrid hardware, as well as its treatment by customs	*Hardware quality:* Lack of clarity or uncertainty regarding government technical standards to ensure safety of mini-grid hardware	Gender gap in access to information and technical skills which makes women less able to assess different levels of quality. They may also be seen as softer targets for poor quality.	Hardware manufacturers, technical regulator, customs (excise)	National, state	Increased access to technical education, training and information	Increase women's access to technical skills through trainings and capacity development as well to information.	3.1
		Availability of hardware: Lack of a competitive market for buying hardware (from both international and domestic suppliers); where appropriate, lack of locally tailored hardware						
		Customs: Cumbersome customs/clearing process for importing hardware, leading to delays in delivery; punitively high customs tariffs on minigrid hardware, particularly in comparison to other sectors.						

BARRIERS						MENU OF SELECTED PUBLIC INSTRUMENTS		Link to the Theory of Change
						Policy instruments to address gender specific barriers		
Risk Category	Description	Underlying Barriers	Increased probability of occurrence for women	Key Stakeholder Group	Governance Levels	Activity	Description	TOC output
6. Labour Inputs Risk	Risks arising from the lack of skilled and qualified potential employees.	Lack of a competitive labor market of educated, skilled and qualified potential employees, leading to higher costs, hiring non-local staff and suboptimal performance	*Discriminatory social norms and stereotypes:* about gender roles and differences in aptitude shape preferences and perceptions that women are 'unsuitable' for sectors that traditionally employ men. Gender stereotypes contribute to the education and skills gender gap, particularly in the science, technology, engineering and mathematic (STEM) fields, which further reduces the availability of qualified potential employees and developers	Labour force, academic institutions	National, state, local	Improve women's access to education and training to increase deployment of RETs and achieve gender equity in the field	Promote initiatives that encourage women to seek careers in the renewable energy fields through scholarships, internships, academic and industry research. Enhance women's technical and business skills. Ensure that energy policy making is coordinated with policies for education	3.1, 2.2
		Discriminatory business practices in hiring, promoting and paying women; workplace harassment				Address discriminatory social norms, attitudes and behaviours to encourage women to enter the RE sector as entrepreneurs and employees	Assess and address the root causes of discriminatory norms and attitudes by developers as employers towards women as energy employees; raise awareness of employers of women's comparative advantages in the areas of customer acquisition and credit repayment	3.3
						Promote adoption of the Women Empowerment Principles on safe and bias-free working environments that attract, retain & promote women	Promote women in decision-making positions; ensure equal pay for equal work.	3.3
							Access to remedial measures for workplace harassment, discrimination and abuse of power	3.3
		Women's disproportionate responsibility for domestic work and unpaid care: limits their participation in the renewable energy labour market as entrepreneurs and employees				Recognize, reduce and distribute women's proportion of domestic work and care	Promote family friendly policies & child care; promote gender certification of companies.	3.3, 2.2
7.-Developer Risk	Risks arising from limitations in the developer's capability to efficiently and effectively design, install, operate, maintain and monitor its minigrid	*Effective execution – planning and design:* developer's challenges (lack of information, capacity, experience, unforeseen events) in executing its role regarding business planning, financial structuring and plant design (resource and demand assessment)	*Gender skills/capability gap of the developer:* Women mini-grid operators are more likely to be affected due to the occupational gender gap in entrepreneurial and business skills	Project developer / energy services company	National, state, local	Capacity development of women mini-grid operators	Capacity development of women mini-grid operators technical skills in terms of entrepreneurial, business and finance skills	3.2
						Targeted information-sharing with women developers	Ensure women developers are a specific target group when sharing demand and resource data	3.1
			Resource and demand – proximity to customers: Across developing countries, women are typically the primary household energy managers. Close to their customers, women entrepreneurs have the potential to lower customer acquisition and servicing costs and drive these new decentralized solutions					
		Effective execution – installation and operations: developer's challenges (lack of information, capacity, experience, unforeseen events) in executing its roles regarding installation, operations, maintenance and monitoring.	*Gender skills/capability gap of the developer:* Women mini-grid operators are more likely to be affected by the risk of unforeseen costs or delays during project development due to the occupational gender gap in technical skills			Capacity development of women mini-grid operators	Capacity development of women mini-grid operators technical skills in terms of planning, design, construction, operations and maintenance	3.1
		Lower access to recourse: Women entrepreneurs may be seen as easier for targets for non-compliance on contracts due to their lower access to remedial measures				Access to remedial recourse mechanism for breach of contract	Increase awareness of rights and access to remedial measures and justice for contract compliance (e.g. through a one stop shop for women entrepreneurs)	3.2, 2.2
		Security: Risks of violence against women restrict the movement of women and their occupational choices				Adjust the supply chain and team composition to prevent violence against women professionals	Assess the risk associated with each segment of the supply chain, segment the supply chain to prevent exposure to security risk , adjust the team composition	3.3
		Gender gap in land ownership: due to inadequate or discriminatory legal, and social structures and norms (e.g. male preference in inheritance, privileges of men in marriage). Customary and traditional practices also undermine gender equality with regard to land tenure which limit female mini-grid operators from acquiring land for their projects				Alternative supply chains and titling arrangements; Legal and policy reform; customary and traditional practices reform	Raise the awareness of women entrepreneurs on existing statutory and customary land titling, impact on different business models and alternative titling arrangements; ensure that energy policies are linked to land reform in order to ensure equal rights between men and women to own, use and control land.	3.2, 2.2

BARRIERS					
Risk Category	**Description**	**Underlying Barriers**	**Increased probability of occurrence for women**	**Key Stakeholder Group**	**Governance Levels**
8. Financial Sector Risk	Risks arising from scarcity of domestic investor capital (debt and equity) for renewable energy, and domestic investors' lack of familiarity with renewable energy and appropriate financing structures	*Developer credit worthiness and cash flow strength:* Inability for developer to secure financing from investors due to lack of credit worthiness, or insufficient cash flows to meet investors' return requirements	Lower levels of collaterals associated with discriminatory laws in terms of land and property rights reduce the credit worthiness of women developers and their ability to secure financing from investors	Domestic investors (equity and debt), financial sector regulator	National, state
		Capital scarcity - harmful social norms: Harmful social norms creates an investor bias against financing women entrepreneurs and thus a greater scarcity of capital for renewable energy operated by female mini-grid operators			
		Capital scarcity - under-developed domestic financial sector: Low number of well-capitalised actors (debt, equity, insurance, pensions); lack of regulatory clarity on new types of financial products	Lack of rural bank branches are more likely to affect women developers because of their lower levels of mobility (due to domestic responsibilities, social norms, security)		
		Capital scarcity - liquidity constraints in domestic banking: Limited availability of domestic loans, at long maturities, due to high banking reserve requirements			

MENU OF SELECTED PUBLIC INSTRUMENTS		Link to the Theory of Change
Policy instruments to address gender specific barriers		
Activity	**Description**	TOC output
Design new financial products	Design and manage new financial products adapted to the collateral and cash flow profile of women entrepreneurs	4.2
Reduce risk and incentivize local financial institutions to lend to women entrepreneurs	Development of dedicated credit lines, quotas and credit enhancement instruments; partnerships with development banks	4.2
Capacity development of loan officers	Train loan officers on appraising clean energy loans for women SE entrepreneurs and on new financial products; raise awareness of employers of women's comparative advantages in the areas of customer acquisition and credit repayment	4.2
Address discriminatory social norms and practices	Outreach, engagement and capacity development with investors and commercial banks to address the gender bias	4.2
Design innovative financial solutions	For example, leverage challenge funds to incentivize the private sector to find new ways of extending financial services to women, or diaspora web-based platforms that provide women entrepreneurs with access to affordable upfront capital	4.3

		Capital scarcity - competing incentives/ mandates :existing policies incentivize or mandate domestic financial sector (banks, pension funds) to invest in alternative, competing sectors to minigrids							
		Limited domestic investor experience with minigrids: Lack of information, assessment skills and track-record for minigrid projects amongst domestic investor community; lack of network effects (investors, investment opportunities) found in established markets; lack of familiarity and skills with appropriate finance structures							
9. Payment and Credit Risk	Risk arising from customers' willingness, ability, and methods of payment for electricity	*Lack of information on customer credit worthiness:* Lack of customer credit data with which to assess the ability of customers to pay for the initial connection fees, ongoing electricity bills and ancillary equipment (e.g. lights and appliances)		End-users, consumer credit data sector and regulator	National, state, local				
		Poor creditworthiness and non-payment: Risk of delayed, reduced or non-payment by customers due to poor credit worthiness, lack of funds available, electricity theft and social dynamics	Women entrepreneurs' greater knowledge of the creditworthiness of their women customers enables them to better mitigate this risk. Furthermore, women entrepreneurs are likely to particularly benefits from policy instruments and interventions that increase the repayment capacity of women customers in terms of increase energy demand.				SE deployed to health centers, schools and water supply systems as key economic enablers and time saving infrastructure and services	Bring stakeholders from energy, health, water and education sectors together to identify energy gaps, priorities and formulate holistic SE deployment plans and service platforms to increase access to health, education and water centres.	5.1, 2.2
							Promote the productive use of energy access in the agricultural sector	Access to electric irrigation pumps; electrical farming equipment etc.	5.2
							Promote the productive use of energy in the micro service sector	Efficient lighting/electricity for SMEs. Development of other income generating activities, including through establishment of market associations, access to market information and skills enhancement.	5.3
		Poor customer finance channels and regulations: risk arising from lack of, or unreliable consumer finance channels (e.g. mobile money and /or local micro-finance) or regulations that hampers availability of and access to local customer finance channels.							
10. Currency Risk* **Note this risk category only applies if financing is in hard currency.*	Risks arising from currency mismatch between hard currency debt/equity and domestic currency revenues.	Uncertainty due to volatile local currency; unfavourable currency exchange rate movements resulting in domestic currency revenues not being sufficient to cover debt/equity servicing.		Macro risk	National				
11. Sovereign Risk	Risks arising from conflict, political instability, economic performance, weather events, legal governance, ease of doing business and infrastructure in the particular country	Limitations and uncertainty related to conflict, political instability, economic performance, weather event/natural disasters, legal governance, ease of doing business, crime and law enforcement, land tenure and infrastructure in a particular country							

Annex 2: Generic Theory of Change to promote women's entrepreneurship for sustainable energy

Goal	**Women's entrepreneurship and leadership accelerate universal sustainable energy access.** **Key indicators:** % of population with electricity access; Renewable energy share in the final energy consumption (%); % change in income of electrified communities. **Guiding normative frameworks** include the SDGs, CEDAW, Beijing Platform for Action, Rio+20, SE4ALL.			
Goal Statement	If (1) energy planning and policy development is gender inclusive and responsive; if (2) skill, information and social norm barriers for women SE entrepreneurs are removed; if (3) women have access to finance; and if (4) women's productive use of SE is promoted; then (5) women will play a leadership role in promoting, managing and benefiting from SE; because (6) women are the primary users of essential energy services in households and communities in developing countries and can be powerful agents of change in the transition to climate resilience and sustainable development.			
Outcomes	**2. Energy planning and policy development is gender inclusive, participatory and responsive.** Key indicators: % of women involved in designing energy plans/policies; existence of targets in energy plans/policies on women's production and use of energy; budget allocations for implementation of targeted policies for women's production and use of energy.	**3. Skill, information and social norm barriers are removed and equal opportunities are created for women's decent employment in the SE sector.** Key indicators: % distribution of tertiary graduates by sex and field of study; % of firms with female participation in ownership or top management.	**4. Access to finance for SE is increased for women.** Key indicators: % of firms identifying assess to finance as a major constraint; # or new financial products designed to meet the unique requirements of women entrepreneurs.	**5. Women's productive use of SE is promoted, and time dedicated to unpaid care and domestic work is reduced.** Key indicators: % of schools and health centers with access to electricity; average weekly hours spent on unpaid domestic and care work by sex, age, and location.
Outcome TOC	If (1) women can engage in energy planning and policy making; then (2) energy planning and policies are responsive to the needs of women and benefit them because (3) evidence has shown that those actors with control over energy planning tend to benefit the most from energy policies and investments.	If (1) women have access to required skills and information, and their engagement in SE is supported by enabling social norms and safe working places; then (2) equal opportunities are created for women's decent employment in in the SE sector; because (3) key barriers underlying the gender gap in the SE labour market have been addressed.	If (1) key financing barriers for women have been addressed; then (2) women entrepreneurs will be able to invest in the SE sector; because (3) they have access to affordable, long-term finance.	If (1) women have access to reliable and affordable energy services for domestic and productive uses as well as for public services; then (2) women can have higher disposable income; because (3) unpaid care work is reduced, they are better educated and healthier, and can engage in new income generating activities.
Outputs	**2.1. Improved capacity of women's associations and policy makers to understand gender responsive energy policies and effectively engaged in planning and policy development** (capacity development of women's organizations, policy makers at national and local level on key energy challenges, different policy instruments and technologies, costs and benefits etc; linking women's association with energy policy makers). **2.2. Targeted gender responsive sustainable energy instruments incorporated into energy policies and linked with other relevant sectoral plans**(e.g. technology choices take into account gender specific opportunities and challenges; quotas and targets for percentage that power companies need to deliver from women owned decentralized SE sources; women's employment, licensing and access; licensing processes streamlined; fiscal incentives and public financing assessed and/or developed to ensure implementation of gender specific policies; cross referencing on policies related to education, health, water, justice, civil registration and land). **2.3. Implementation of gender-sensitive provisions of energy plans are financed, monitored and evaluated** (appropriate budget allocations for implementation of energy plans and policies made, implementation of the different policy impacts for men and women are monitored and assessed to educate future market transformation efforts).	**3.1. Improved access to technical education, training and information for women in sustainable energy** (Promote initiatives that increase the proportion of women in technology and engineering fields; address discriminatory social norms and gender stereotypes; enhance women's technical skills through trainings on design, installment, maintenance and consumption of SE technologies; skills development to participate in the engineering design of SE solutions and development of technical standards). **3.2. Women's entrepreneurial skills and business capacities in the SE sector are enhanced** (training on business plan development, procurement, marketing, financial management, legal frameworks, land tenure, existing remedial recourse mechanisms in case of contractual breaches; provision of apprenticeship, mentoring and dedicated business incubation services; shifting women's perception of suitable gender roles and increasing awareness of their rights; public campaigns to challenge harmful social norms). **3.3 Increased access to safe, bias-free working environments that attract, retain & promote women** (Promote family friendly policies & child care; address workplace harassment & perceptions of women as 'unfit' for employment in engineering, technical or business fields; prevent violence against women professionals through work on social norms, segregation of the supply chain, and team composition).	**4.1. Traditional and innovative sources of finance, financing instruments, and public/private financing models are identified and explored** (some options may include: directed credit, direct lending, credit enhancement mechanisms; innovative sources of finance such as web based diaspora platforms). **4.2. Improved access to upfront capital through concessionary financing for women from MFIs, DFIs and commercial banks** (trainings on the specific needs of women entrepreneurs, appraising clean energy loans for women SE entrepreneurs, and designing and managing new credit products with longer maturities; partnerships developed with multilateral, regional and national development finance institutions to provide credit lines and credit enhancement instruments to local financial institutions in liquidity constrained environments). **4.3. Innovative financial solutions for women SE entrepreneursand customers are developed and scaled up** (e.g. partnerships with challenge funds, web based diaspora platforms).	**5.1. SE deployed to health centers, schools, water supply systems** (Bring stakeholders from energy, health, education, water supply sectors together to identify energy gaps, priorities and formulate holistic SE deployment plans and service platforms). **5.2. Improved capacity of women farmers to use SETs to address labor shortages and increase agricultural productivity** (Powered water supply schemes, access to electric irrigation pumps and other farming equipment). **5.3. Improved capacity of women to use SETs to start-up/scale up micro and medium entreprises** (efficient lighting and electricity for SMEs; skills training and cahhpacity-building for SE businesses; leverage financial intermediation services for SE entrepreneurs; increase access to market information).
Key Assumptions	- Women place a strong premium on clean energy access. However, they do not have the same influence over investment decisions.	- Decentralized SE technologies are the most cost effective solutions in a growing number of developing country contexts; - Growth of SE will create employment opportunities in existing and new sectors; - There is a skilled labour shortage for SE.	- Women have lower levels of collateral due to discriminatory laws (land, property rights), which reduces their credit worthiness and ability to secure long-term, affordable finance; - Women are more likely to be affected by under-developed financial sectors, particularly the lack of rural bank branches due to their limited mobility.	- Productive use of energy will be promoted to increase income-generating opportunities and end-users' capacity to pay for increased energy consumption services over time; - Access to energy reduces unpaid care and domestic work and opens new economic opportunities for women.
Risks & Barriers	- Women's participation is not translated into gender-responsive policies; - Gender-responsive policies are not translated into practice (political, technical, behavioural and financial barriers); - Strong interest groups favouring fossil fuel assets win over those favouring SE solutions.	- Investment in education does not necessarily translate into employment; - High skill barriers in the energy service sector; - Social protection and non-discriminatory policies are not translated into practice; - Weak education and justice systems.	- High financing barriers in the SE sector; - Required financing (type & scale) is not available; - Discriminatory social norm regarding investor bias towards women entrepreneurs cannot be shifted in the short-term.	- Women are not included in the design of end products, which reduces adoption rates by women; - Savings in time and money are not translated into higher disposable income for women because of the lack of investment in other productive sectors and income generating activities.

Annex 3: Extended country analyses

In this annex, we provide expanded briefings for each country, including (1) an overview of the present state of the energy sector; (2) an introduction to the finance sector including adaptability to the local context of innovative finance and payment solutions; (3) a preliminary analysis of the opportunities for, and barriers to SET growth; (4) an overview of gender issues; and (5) an outline of a possible gender-sensitive strategy for overcoming these barriers. It is important to note that at this stage the country strategies are preliminary. Each focus country will do through a detailed analysis in order to develop a roadmap, which will contextualize the generic theory of change and articulate its strategy for addressing the gender-specific barriers to women's entrepreneurship and leadership in sustainable energy.

As an illustration of potential SET markets in focus countries, simulations of The Solutions Project's model for what a transition to a 100% sustainable energy technology mix by 2050 could look like in each market are used. The Solutions Project was founded in 2011 by Stanford University professor Mark Z. Jacobson and prominent bankers, public figures, and climate scientists to drive a transition to 100% sustainable energy by 2050. These projections have been included to help size up the untapped market potential for decentralized SETs. It is recognized that this will only be suitable for a portion of the market.

Bolivia

Energy Sector

The Bolivian electrical system is made up of the National Interconnected System (NIS), which supplies electrical power to eight of the nine departments in Bolivia, and the Isolated Systems that supplies electricity to a Department (called the Cobija System) and other systems located far away from the electrical grid. Bolivia's energy sector has two striking features. The urban electrification rate is high at 97%, while its rural electrification rate ranges from estimates of between 28% and 50%,[73] to 68%.[74] At national level 87% of the population has access to electricity services.[75] By 2025, the government plans that 100% of the population will have access to electricity. Second, thermal and hydro generation comprise well over three quarters of power generation. Excluding these subsectors, sustainable energy penetration stands at 2%. According to a 2015 IMF report, Bolivia's energy subsidies amount to 5% of GDP and are large vis-à-vis other oil importing countries.[76] The matrix of power generation in the NIS is composed of 72% thermoelectric power, 26 % hydroelectric power, and 2% alternative energies (wind and biomass). Currently, the government is working on changing the energy mix, and estimates that by 2025 it will be 74% hydroelectric generation, 23% thermoelectric and 4% alternative energy.

Empresa Nacional de Electricidad (ENDE Corporation), a state-owned power generation, transmission, and distribution firm dominates the market. A private company, *Compañia Boliviana*

[73] World Energy Outlook 2014– Electricity Access Database, OECD/IEA.
[74] Government of Bolivia
[75] Government of Bolivia
[76] Di Bella, G., Norton, L., Ntamatungiro, J., Ogawa, S., Samake, I., and Santoro, M. (2015). Energy Subsidies in Latin America and the Caribbean: Stocktaking and Policy Challenges. *IMF Working Paper*.

de Energía Eléctrica (COBEE) is another major player. Both provide grid-connected energy solutions. The off-grid sector, known as *Aislado*, is much smaller and dominated by IPPs that primarily serve the northern and western portions of the country. As of 2004, the major IPPs in the country include:

- SETAR (*Servicios Eléctricos Tarija, S.A.*): 44 MW, serving 56,885 clients
- ENDE (*Empresa Nacional de Electricidad*): 16.65 MW, serving 28,554 clients
- CRE (*Cooperativa Regional de Electricidad*): 14.53 MW, serving 4,940 clients

State participation, through the National Electricity Company, ENDE, has the greatest involvement in generation, transmission and distribution of electric energy, operating strategically through its Affiliated Electrical Companies, to satisfy the demand for electrical energy of the country. ENDE through 2014 had six generating companies, two transmission companies, five companies in distribution and two service companies (EDESER and the CADEB) which constitute in affiliates and subsidiaries 79% of the generating capacity, 83% of the lines of transmission and 63% of the distribution in the National Interconnected System, are administered by the Bolivian State.

In 2014, total electricity demand in Bolivia was 1.3GW while the nation's energy sector supplied 1.6GW. The combination of excess supply and an underserved rural population suggests high grid extension costs and growth opportunities in the *Aislado* sector.

The energy component of Bolivia's Intended Nationally Determined Commitment (INDC) includes raising the share of sustainable energy from 40% to 79% by 2030. Bolivia's INDC commitment strongly connects its sustainable energy commitments to its poverty reduction and economic growth targets. It aims to reduce its Unsatisfied Basic Needs (NBI) arising from lack of energy from 14.6% in 2010 to 3% by 2025, as well as to reduce absolute poverty through "growth, distribution and redistribution of energy income." It also aims to develop 8.9 GW of electricity capacity for export and increase GDP by 5.4% due to energy sector growth. There is no specific gender commitment in the INDC.

Mobile Money & Finance

Mobile phone penetration in Bolivia has been estimated at 101.6%.[77] Both CGAP and GSMA's Mobile Money for the unbanked cite Bolivia as a competitive market for mobile money providers. Millicom, a multinational media and telco company, expanded its mobile money product, Tigo Money, to Bolivia in 2013. Tigo maintains a network of 500 E-Fectivo locations spread throughout the country where users can send and receive payments.

Development finance institutions are also running several anti-poverty programmes that specifically target women-led initiatives. The most relevant program is *Proyecto de Inversión Comunitaria en Áreas Rurales* (PICAR), administered by the *Emprendimientos Organizados para el Desarrollo Rural Autogestionario* (EMPODERAR) through the Ministry of Land and Rural Development. PICAR is a community-driven development programme that allows local

[77] Lancaster, H. (2015). Bolivia - Telecoms, Mobile, Broadband and Digital Media - Statistics and Analyses. *BuddeComm*.

committees to identify investment priorities and administer government funds. The programme has funded 700 "subprojects" impacting 150,000 individuals and aims to double its reach by 2019. Women hold over 60% of the seats on PICAR investment committees.[78]

Market Opportunities & Barriers

The Solutions Project's simulation (shown in the table below) highlights several opportunities in solar, wind, and geothermal energy production, which could lead to a complete transition to 100% sustainable energy power sources in Bolivia by 2050. The plan estimates that this renewable energy mix would yield a $0.09/kWh energy tariff, against a 'business as usual' scenario of $0.11/kWh. The co-benefits of this scenario would be the creation of an estimated 29,850 jobs, avoided health costs valued at US $500MM annually, and a per capita total annual savings of $626 by 2050.

Residential rooftop solar	18.7%	**Commercial & gov't rooftop solar**	7.3%
Solar plant	25.8%	**Wave energy**	0%
CSP	5%	**Geothermal**	15%
Onshore wind	25%	**Hydroelectric**	3.2%
Offshore wind	0%	**Tidal turbine**	0%

The Bolivian government has historically favored large-scale power generation projects in order to raise and satisfy domestic consumption as well as create excess capacity for export. The present administration aims to leverage its geographical position and hydrocarbon resources to become the "energy heart of South America."[79] Given the high cost of grid extension and low per capita consumption in rural areas, off-grid solutions stand to accelerate Bolivia's goals. In order to grow the off-grid sector in Bolivia, whether through rural cooperatives or private LSEEs, policymakers will need to identify targeted opportunities for sustainable off-grid solutions and create the regulatory frameworks to unlock the opportunities.

Gender

Bolivia's new 2009 Constitution recognizes and guarantees women's social, economic and political rights. There are at least 16 articles in the Bolivian Constitution that explicitly deal with gender equality across several social, political, and economic axes. The government has shown strong support for passing, implementing and enforcing gender-sensitive legislation. For example, electoral law n°026 recognizes gender parity in parliament and law n°3545 requires land titles to be listed in the name of both a husband and wife. This ensures women's access to land, which is important as collateral for securing long-term affordable finance. As a result of these laws, in 2014, more than half (50.15%) of Bolivian parliamentarians were women and 46% of land titles were women-owned.[80] Paragraph I of Article 20 of the Bolivian Constitution also protects the right to universal electricity access. However, a gender-specific approach to energy access has not been established

[78] Sanjinez, X. R. (2015). Taller sobre Iniciativas Empresariales de Mujeres en Desarrollo Sostenible y Acceso a Energía [Powerpoint slides].
[79] Wilson, J. (26 October 2015). Bolivia wants to become the energy heart of South America. *Financial Times*.
[80] Women in Parliaments: World Classification, December 2015. Available at: http://www.ipu.org/wmn-e/classif.htm.

The Vice-Ministry of Women (VMM), a dependency of the Ministry of Sustainable Development, is in charge of gender affairs with the Women for Equity Coordination Office. In 2009, the Vice-Ministry for Equal Opportunities was also created within the Ministry of Justice to promote women's rights and the rights of indigenous women in particular. In addition, Bolivian women have formed several associations to defend and promote their rights, including the Women's National Political Forum of Bolivia, the Association of Councilwomen of Bolivia, and the Union of Parliamentary Women parliamentarians of Bolivia.[81]

However, women in Bolivia still face a number of barriers to access finance. Studies have shown that whereas 22.90% households in Bolivia are female-headed,[82] only 38% of women adults have an account at a financial institution, against 44% of men.[83] Economic opportunities for women are generally increasing, evidenced by the unemployment rate of women, which decreased from its highest value of 9.4% in 2009 to 3.6% in 2013.[84]

Access to clean energy technologies are needed to fulfill women's sustainable energy needs for education, health, telecommunications, water pumping, and other productive uses (e.g. agriculture, processes for production of food and textiles such as alpaca wool). Some initiatives targeting women specifically are in place, particularly those centered on improved cook stove distribution.

Potential Gender-Responsive Strategies

The Bolivian government's efforts to reduce energy poverty and generate energy for export should be seen as complementary goals. The LSEE model that will provide access to the rural poor (who generally have extremely low energy demands) is unlikely to have a meaningful impact on the balance of trade. On the other hand, an improved balance-of-payment will enable Bolivia to better support the *Aislado* sector.

The Programme may leverage the strong penetration of mobile money technologies and a tradition of local, cooperative-driven development to foster the development of the *Aislado* sector. The Government's strong emphasis on gender equality creates a conducive legal and policy environment to address gender-specific barriers and bolster women-led LSEEs in this sector. Technical and financial skills training to support both prospective women energy cooperatives and private LSEEs to develop and implement business plans for the provision of sustainable energy services, will been needed. The business plans for the projects should be coupled with a mobile money platform. Individual or groups of women who participate in these training efforts could be provided opportunities to form companies, with streamlined licensing processes and access to mentors. To prioritize interventions, research is required to identify the communities least likely to receive grid connection within the next ten years, their energy demands, and their willingness

[81] UNDP 2014: Promoting gender equality in electoral assistance: lessons learned in comparative perspective, Country report for Bolivia. Available at: http://www.undp.org/content/dam/undp/library/Democratic%20Governance/Electoral%20Systems%20and%20Processes/2122-UNDP-GE-bolivia.pdf

[82] World Bank, Health Nutrition and Population statistics, 2008. Available at: http://databank.worldbank.org/data/reports.aspx?source=health-nutrition-and-population-statistics

[83] World Bank, Financial Inclusion Data/ Global Findex, 2014: Account at a financial institution, female (%age 15+). Available at: http://datatopics.worldbank.org/financialinclusion/country/bolivia

[84] ILO statistics, 2013 and 2009, Country Profiles, Bolivia. Unemployment rate of women. Available at: http://www.ilo.org/ilostat/faces/home/statisticaldata/ContryProfileId?_afrLoop=101215730401052#%40%3F_afrLoop%3D101215730401052%26_adf.ctrl-state%3Dtgjiebnjt_158

to pay; and to assess existing government programmes to identify potential for synergies and avoid overlap.

Multi-stakeholder public-private partnerships could also be promoted to stimulate productive uses of energy in the agricultural and service sectors as well as investment in essential infrastructures that reduce women's unpaid domestic and care work. After target communities have been selected based on fit with the national grid extension plan and existing programmes, women-led regional investment committees could be formed (or PICAR investment committess could be leveraged). Such committees could be provided with access to technical experts to create a community development plan that ranks development priorities based on timesaving and productive use metrics. Priority should be given to projects that use SE in applications that are underdeveloped in the Bolivian market. The resulting pipeline of the projects could then be financed by domestic government agencies, development banks, and donor countries. Aggregating the projects will increase the likelihood of success due to economies of scale with regard to due diligence costs.

India

Energy Sector

Coal-based power plants continue to dominate India's energy sector, and have been historically under the control of national public sector companies like Coal India and the National Thermal Power Corporation. However, the Ministry of New and Renewable Energy oversees India's rapidly growing sustainable energy sector, which includes solar, wind, and biomass-based energy sources. Installed capacity from non-hydro non-nuclear sustainable energy sources currently stands at 13%, while nuclear energy comprises 2% of total installed capacity and hydro accounts for 15%.[85] Increasingly, the policy of the government has been to decouple the mining, electricity generation, transmission, and distribution sectors, and to gradually introduce private participation in each of these sectors.

As per the 2011 census, nearly 70% of households live in rural areas.[86] Only 67% of the total households and 55% of the rural households have access to electricity for lighting. Two-thirds of the households continue to use "dirty" fuels for cooking, including firewood, crop residue, and cowdung cakes, all of which cause respiratory diseases, particularly among women. The penetration of cleaner fuels like liquid petroleum gas (LPG) remains low in rural areas. The Government is supporting an increased penetration of LPG through pricing reforms and subsidy rationalization to ensure that cooking fuels are better directed towards economically and socially disadvantaged households.

India's INDC contribution plans to add 175 GW of non-fossil fuel capacity by 2022 and grow the share of non-fossil fuel capacity to 40% by 2030 (it is estimated that India has 900 GW of sustainable energy capacity). It also commits to reductions in its emissions intensity and the creation a carbon sink by adding tree cover. India's INDC does not contain gender-specific goals.

Mobile Money & Finance

[85] BP Statistical Review of World Energy. (June 2015). BP. *64th Edition*.
[86] About 70 per cent Indians live in rural areas: Census report. (15 July 2011). The Hindu.

Money-lenders remain the dominant source of finance for most households on a day-to-day basis, as they offer greater flexibility and lesser documentation and /or collateral. In contrast, despite persistent efforts of governments at the central and state levels to improve access to banking since the 1960s, only 58% of the households operate bank accounts and access to institutional credit for farmers and small businesses is poor.

The central government believes that mobile phones provide a possible solution to the last-mile problem that has plagued banks and credit cooperatives. Mobile phones have penetrated the Indian countryside at a rapid pace, and as of 2011, 59% of Indian households owned a mobile phone.[87] Programs like the *Jan Dhan Yojana (*People's wealth scheme) aim to universalize bank access by mobilizing mobile phone technologies and by linking social welfare benefits to bank accounts.

Market Opportunities & Barriers
With a large population, vast geography, and widely varying income levels, sector growth will vary significantly between Indian states. At a high level, various forms of solar comprise more than three quarters of The Solutions Project's 2050 100% renewables goal, with onshore wind coming in a distant second. This ambitious scenario would result in an estimated 3,603,940 jobs, save $5.3 trillion (12.6% of GDP) in avoided health costs, lower the unit cost of electricity to $0.08/kWh (against $0.10/kWh under BAU), and yield a total per capita annual savings of $4,030.

Residential rooftop solar	6.3%	**Commercial & gov't rooftop solar**	8.7%
Solar plant	50.3%	**Wave energy**	0.4%
CSP	11.5%	**Geothermal**	0%
Onshore wind	17%	**Hydroelectric**	2.6%
Offshore wind	3.2%	**Tidal turbine**	0%

Decentralized renewable energy solutions face a number of market, regulatory and financial barriers, including:

- Although subsidies for petroleum-based fuels are being gradually eliminated, many state governments continue to make subsidized kerosene available for cooking and lighting to eligible households through the public distribution network.

- The *Jawaharlal Nehru National Solar Mission*, the main policy instrument through which the MNRE has sought to increase solar capacity in India, has been challenged in the dispute settlement of the World Trade Organization by the United States for its domestic content requirements.[88] The initial ruling, which went against India, is now being appealed. Given India's historically weak trade position *vis-à-vis* industrially advanced countries, this poses a threat to the viability of India's ambitious program to increase the share of solar energy in its electricity profile.

[87] Kurtz, A. In India, more cell phones than toilets. CNN Money.
[88] India — Certain Measures Relating to Solar Cells and Solar Modules. World Trade Organization. Dispute Settlement: Dispute DS456. Retrieved from: https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds456_e.htm

At the same time, there is a strong commitment to rationalize the energy policy in favor of climate-friendly alternatives that promise a number of "co-benefits." Improved cooking stoves and efficiency improvements in power plants can reduce emissions of black carbon and carbon monoxide, whose greenhouse effects are relatively high, while also improving ambient air quality in residential and industrial areas. Efforts to prevent fuel adulteration and to improve vehicle technologies through regulation promise similar benefits in India's mega-cities. The institutional capacity needed for these activities is often underdeveloped. Policy reforms will therefore ultimately depend on the success of deeper administrative and institutional reforms at all levels of government.

Gender

In India, the Ministry of Women and Child Development promotes social and economic empowerment of women through cross-cutting policies and programmes, mainstreaming gender concerns, creating awareness about their rights, and facilitating institutional and legislative support to enable women to realize their human rights.[89] However, women's participation in political decision-making is limited. In 2015, women constituted only 12.4% of parliamentarians in India.[90]

There is also a gender gap with regard to access to skills and finance. Female-headed households represent 14.4% of total households,[91] but only 43% of women adults possess an account at a financial institution in comparison to 62% of men.[92] Many programmes promoting decentralized SETs have been implemented in the country, but none have a gender focus (e.g. *Mahila Urja Centre, Mohalla Mandal, Rajnandgaon, Chhattisgarsh* launched in June 2012; the Renewable Energy Centre in Bolangir, Odisha launched in June 2012). However, women are very engaged in formal and informal savings and self-help groups which can be registered by the banks, and help women to access credit and built their credit history. This also provides a way to identify potential women entrepreneurs.

Potential Gender-Responsive Strategies

There are opportunities for women on both sides of energy capacity. Policymakers have opportunities to develop engendered energy policies to correct structural barriers currently preventing the equal participation of women in the sector. For instance, it will be important to explore strategies related to access to finance, for example through concessional financing for women-led or women-majority businesses, can be used to expand existing IPP capacity. India has also indicated its interest in piloting de-risking strategies with existing formal and informal women savings and self-help groups. On the other side of the coin, sustainable energy policy can unlock greater potential for productive uses of electricity by lowering operating costs, which benefit women.

In terms of geographic focus, the Ministry of New & Renewable Energy has expressed an interest in focusing on five states: Madhya Pradesh, Odisha, Telangana, Nagaland, and Uttar Pradesh.

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[89] Government of India, Ministry of Women and Child Development, About the Ministry, Mission. Available at: http://wcd.nic.in/about-ministry

[90] Women in Parliaments: World Classification, December 2015. Available at: http://www.ipu.org/wmn-e/classif.htm.

[91] World Bank, Health Nutrition and Population statistics, 2006. Available at: http://databank.worldbank.org/data/reports.aspx?source=health-nutrition-and-population-statistics

[92] World Bank, Financial Inclusion Data/ Global Findex, 2014: Account at a financial institution, female (%age 15+). Available at: http://datatopics.worldbank.org/financialinclusion/country/india

Indonesia

Energy Sector

Indonesia's unusual geographic and demographic characteristics influence the country's energy sector to an exceptional degree. Approximately 6,000 of the more than 17,500 islands in the Indonesia archipelago are inhabited. About 78% of the population lives on two islands, Java and Sumatra.[93] The wide dispersion of the remaining 22% (56 million) Indonesians presents a challenging market for the provision of basic infrastructure like electricity. Indonesia's 1945 Constitution mandates that all essential utilities must be controlled by the state. Perusahaan Listrik Negara (PLN), the state-owned energy company held the exclusive right for generation and distribution. In 1985, this policy was slightly modified to allow IPPs to sell to PLN's grid due PLN's difficulty keeping up with rapid growth in power demands (around 9% per year).[94] There is, however, an exception for rural electricity cooperatives, which can both generate and distribute power. The average price for electricity is $1,200 IDR/kWh (roughly, US $0.09/kWh), but the price goes as high as $3,000 IDR/kWh (US $0.22) in remote areas that depend on diesel generation.

Despite enormous potential for sustainable energy, Indonesia is increasingly reliant on imported oil. A 2014 McKinsey report has oil imports growing 5-6% per year through 2030, when 75% of Indonesia's oil will be imported.[95] This rapid increase is due to a more than doubling, from 90TWh to 190TWh of the country's energy demand between 2003 and 2013. With exploratory drilling lagging and oil reserves down by over a third, this increase has been met with imported oil.

The Indonesian government has formalized its support of sustainable energy targets in a number of documents (Ministerial Decree No. 002/2004, PR No. 5/2006). However, it is important to note that the current 2025 target of 25% encompasses both "new and renewable" capacity. "New" includes liquefied coal, coal bed methane, gasification coal, nuclear, and hydrogen.

Indonesia's primary INDC commitment is an "unconditional" 29% decrease in emissions (adding 3% to its existing 26% by 2020 commitment) and a 41% reduction on certain conditions for international assistance and cooperation. The INDC explicitly links climate resilience to anti-poverty measures, flagging the issue that climate change-linked hydro-meteorological disasters make up 80% of disasters in Indonesia, are on track to increase, and noting that "the poorest and most marginalized populations tend to live in high-risk areas that are prone to flooding, landslides, sea level rise, and water shortages during the drought." There is no gender component to the INDC.

Mobile Money & Finance

Over 60% of Indonesians have a mobile phone and more than 75% have access to one. Approximately 68% of Indonesians in rural areas own or can borrow a phone.[96] In 2009, Indonesia's central bank created the regulatory framework for a mobile money platform to serve the country's unbanked, estimated at 60% of Indonesia's 250 million citizens. Twenty licensed banks, telcoms, and e-transfer businesses participate in the programme. However, according to a report from research firm Financial Inclusion Insights, only 3% of Indonesians were aware of

[93] Badan Pusat Statistik. Retrieved from: http://www.bps.go.id/linkTabelStatis/view/id/1267
[94] Power in Indonesia: Investment and Taxation Guide. (April 2013). PwC.
[95] Budiman, A., Das, K., Mohammad, A., Tee Tan, K., and Tonby, O. (September 2014). Ten ideas to reshape Indonesia's energy sector. *McKinsey & Company*.
[96] Financial Inclusion Insights: Indonesia. (2015). Retrieved from: http://finclusion.org/country-pages/indonesia-country-page/

mobile banking. Experts cite a number of factors contributing to this low figure, including regulatory restrictions limiting who can participate, underinvestment from participating banks, poor marketing, and the public's lack of understanding.

Earlier this year, Indonesia's Financial Services Authority (OJK) created the *Laku Pandai* program to promote savings accounts with a focus on low-income rural communities. *Laku Pandai* allows approved banks to provide branchless banking services via sales agents. It is governed by a different set of regulatory frameworks than mobile money, and allows customers to earn interest and access loans with no transaction costs. Analysts predict that increased awareness raising will drive mobile finance growth in the coming years. *Laku Pandai* in particular presents an opportunity for lease-to-own solar asset models as a complement to or replacement for service (i.e. pay-as-you-go) models in these communities.

The central government has village financial assistance program ("*Dana Desa*"), which provides $100,000 per year to villages to use on projects that they prioritize. *Dana Desa* does not have an explicit gender lens, but communities have autonomy over how the money is deployed.

Market Opportunities & Barriers
To provide a sense of where the untapped potential lies, the Solutions Project proposes that the most achievable mix for 2050 goal of a 100% sustainable energy-powered Indonesia comprises:

Residential rooftop solar	8.7%	**Commercial & gov't rooftop solar**	8.7%
Solar plant	49.3%	**Wave energy**	2%
CSP	10%	**Geothermal**	3.9%
Onshore wind	6.3%	**Hydroelectric**	1.1%
Offshore wind	10%	**Tidal turbine**	0%

Reaching this 2050 technology mix would create an estimated 1,043,067 jobs, avoid US $192 billion in annual health costs, and lower tariffs to $0.07/kWh with sustainable technologies, against a $0.11/kWh tariff in a BAU scenario. The annual total cost savings per capita would be approximately $1,457.

Poor data, lack of political will, and weak regulatory frameworks have all been cited as barriers to creating an off-grid energy sector in Indonesia. However, the largest barrier has historically been the government's massive oil subsidy, which for example, exceeded $15 billion in 2013, have all been cited as barriers to creating an off-grid energy sector.[97] This created a market distortion that advantaged fossil fuel infrastructure that would have otherwise been uncompetitive.

At scale, geothermal, hydro, and biomass are the most competitive sustainable energy sources. However, due to large-scale generation for the grid depends on PLN approval, this opportunity is extremely sensitive to political and regulatory shifts. In East Indonesia, greater insolation and more challenging grid extension more make the LSEE-generated solar power competitive on a unit cost

[97] "Unpriming the Pump." *The Economist*. 22 June 2013. Web. 09 Feb. 2016.

basis. Nevertheless, small populations with low per capita demand presents unfavorable risk-reward profiles for potential investors, which has prevented significant development to date.

Gender

The Indonesian Ministry for Women's Empowerment & Child Protection is the national entity responsible for formulating government policies in the area of women's empowerment as well as women's welfare.[98] It is supported by Women's Study Centres, established provide technical expertise in the area of gender sensitive policy research. These centres are located in universities and focus on researching issues related to women and gender.[99] Among the Coordinating Ministry for Social Welfare, the Deputy for Women's Empowerment also has a strategic position to advocate for gender equality and promote gender mainstreaming.[100]

The 2000 Presidential Decree on Gender Mainstreaming directs all government ministries and agencies at the national and local levels to adopt a gender mainstreaming strategy in the planning, implementation, and monitoring of development policies and programs. For instance, the 1960 Basic Agrarian Law No 5 enshrines women's land rights and their ability to obtain land titles by registering land in their names. [101] However, in practice the implementation and enforcement of Indonesian laws often discriminate against women. In addition, women hold only 17.1% of the Indonesian Parliament seats.[102]

In Indonesia, 40% of the population (103 million Indonesians) still relied on biomass uses firewood for cooking in 2011, causing over 45 approximately 165,000 related premature deaths per year attributable to indoor air pollution.[103] About 14.80% of households in Indonesia are female-headed.[104] In 2014, 37% of women adults had an account at a financial institution in comparison to 35% of men.[105]

Potential Gender-Responsive Strategies

Indonesia presents two distinct market segments. The first is in off-grid solutions for rural populations unlikely to receive grid access in the coming decades. Addressing this need will rely on gaining access to concessional or grant financing (through for example gradually phasing out fossil fuel subsidies and redirecting part of the fiscal savings to decentralized sustainable energy solutions). The second opportunity leverages the state's control, through PLN, of electricity distribution while allowing for IPPs to sell to the grid. This creates opportunities to create new, sustainable energy IPPs with a creditworthy off-taker (the state).

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[98] ADB, 2006: Country Gender Assessment, Indonesia, p33. Available at: http://www.adb.org/sites/default/files/institutional-document/32231/cga-indonesia.pdf

[99] *Ibidem*, p.34.

[100] *Ibidem*, p.33.

[101] *Ibidem*, p.32 & 29.

[102] Women in Parliaments: World Classification, December 2015. Available at: http://www.ipu.org/wmn-e/classif.htm.

[103] IEA, 2015: Energy Policies Beyond IEA Countries, Indonesia 2015. Available at: https://www.iea.org/publications/freepublications/publication/Indonesia_IDR.pdf

[104] World Bank Statistics, 2012: Female headed households (% of households with a female head. Available at: http://data.worldbank.org/indicator/SP.HOU.FEMA.ZS

[105] World Bank, Financial Inclusion Data/ Global Findex, 2014: Indonesia, Account at a financial institution, female (%age 15+). Available at: http://datatopics.worldbank.org/financialinclusion/country/indonesia

The *Dana Desa* programme is a key opportunity for extending energy access at the community level. Interventions in these markets should target timesaving uses of renewable energy. Examples of this can include solar water pumps for village drinking water and agricultural uses, as well as water heaters. In addition, electrification of health facilities and schools could be prioritized. During implementation, women should be trained in O&M for the projects to create a base level of SE-related technical skills.

The challenging economics of supplying power to *Dana Desa* communities will likely depend on grant financing or (deeply) concessional financing, or both. Therefore, projects will be highly responsive to policy decisions. To most effectively deploy grant finance to remediate structural disadvantages facing women, this programme could recruit a liaison with experience with the *Dana Desa* programme to ensure that women are present in both planning and reporting processes at the ministerial level in Jakarta.

The more financially lucrative opportunity would involve the government offering preferential feed-in tariffs for grid-connected mini grids. A key barrier here will be PLN's tepid credit rating. Ratings agencies assign it the lowest investment grade rating, citing PLN's high debt burden, inefficient technology mix, and "uncertain tariff environment."[106] While satisfactory for obtaining capital, these factors leave PLN vulnerable if economic conditions worsened. Currency risk is also high because revenues are denominated in local currency, but operating costs (e.g. fuel purchases) largely occur in US dollars. If PLN creates a more stable tariff environment, grid-connected IPP project costs would become very bankable. Further, driving renewable energy growth can address the inefficient technology mix affecting PLN's credit rating and lower the foreign currency risk by reducing dependence of energy inputs denominated in foreign currencies. (The overall net benefit also assumes that the IPPs are of sufficient scale to meaningfully relieve both PLN's CAPEX and OPEX burdens.) Thus, Indonesia stands to improve the creditworthiness of its state utility, its overall trade balance, and climate resilience—without increasing its debt load by creating contracts financed by commercial banks—by pursuing an IPP strategy.

The most financially lucrative (and sustainable) opportunities for women in Indonesia's renewable energy sector are grid-connected projects. If the government offered a combination of preferential contracts and technical assistance, these projects would likely be funded by commercial banks. A first step would involve building political will by convening all government stakeholders (Ministry of Women Empowerment & Child Protection, the Ministry of Village, Ministry of Energy, and Ministry of Home Affairs), civil society organizations, and investors. Women-led firms offering grid connected electricity would gain long term advantages given that their interests would then be directly linked to the state's mainstream economic and environmental interests.

[106] TEXT-S&P summary: PT Perusahaan Listrik Negara (Persero). (4 December 2012). Reuters. Retrieved from: http://www.reuters.com/article/idUSWLB169820121204

Morocco

Energy Sector

Morocco imports more than 94% of its energy inputs and electricity.[107] It brings in coal and oil from global markets, gas from Algeria, and electricity over its borders. In 2002, Morocco allowed duty free oil imports as part of a general movement toward energy market liberalization. Some of these have subsequently been rolled back. Since 2005, a 1.4GW interconnection from Spain has fed the Moroccan grid. This heavy reliance on imports, according to a 2014 report from the International Energy Agency represents, "a significant burden on the balance of payments, and, insofar as some energy supplies are subsidized, a drain on the budget."[108]

The country has aspirations to create a more favorable balance of trade. As part of this plan, the National Energy Strategy, developed in 2009, highlights increasing regional integration with an eye for export, along with increasing the share of sustainable energy, implementing energy efficiency upgrades, and promoting foreign investment. Despite its past emphasis on fossil fuels (and a 2GW coal plant in the pipeline), Morocco also has more than 700MW of wind capacity, 1,000MW more in the pipeline, and according to the National Energy Strategy, plans to add an additional 2GW of wind power, along with 2 GW each of solar and hydropower by 2020. This would grow the share of sustainable energy to 42%.[109]

More recently, at the COP21, His Majesty Mohammed VI, King of Morocco, announced that the share of renewable energy will be increased to 52% by 2030, if Morocco has access to appropriate financing. This would allow Morocco, for the first time in its history, to have a share of electricity produced from renewable sources higher than that produced from fossil energy sources.

Driving energy access has been central to Morocco's economic development strategy since 1995. Over the past two decades, the electrification rate skyrocketed from 18% in 1996 to more than 99% in 2015.[110] This coincided with annual economic growth rate of around 5% per year, which, in turn, further raised per capita energy demand.

With its high electrification rate and government preference for large, centralized energy projects, at first glance, the Moroccan energy sector appears to have little room for the LSEE growth. However, in rural contexts, the electrification rate reflects distribution infrastructure to villages, not individual households. The percentage of households connected to electricity is expected to be lower, though there are no precise figures. This unquantified, untapped rural demand could be particularly attractive white space for women-led LSEEs because there is relatively lesser social pressure against women participating in the labor force in rural areas.

The primary pillars of Morocco's INDC contribution are achieving more than 50% of installed electricity capacity from renewable energy by 2025, reducing energy consumption by 15% by

[107] World Bank Data. Energy imports, net (% of energy use). Retrieved from: http://data.worldbank.org/indicator/EG.IMP.CONS.ZS

[108] Morocco 2014 - Energy Policies Beyond IEA Countries. IEA. Retrieved from: https://www.iea.org/Textbase/npsum/morocco2014sum.pdf

[109] Ibid.

[110] "Rural Electrification Rate in Morocco, 1995-2011." European Parliamentary Research Service. N.p., 14 May 2013. Web. 09 Feb. 2016.

2030, continuing to reduce fossil fuel subsidies, and enabling increased LNG use by improving supply chain infrastructure. Morocco has a commitment to gender balance in its climate change agenda, however has not articulated a specific gender-linked strategy.

Mobile Money & Finance
Mobile telephony has a penetration of 113%, with approximately 90% comprising of prepaid phones. A 2012 IFC report projected that "the combination of high mobile penetration and a significant portion of the population not using formal financial service channels means there is an opportunity for mobile money."[111]

Morocco's MFI boom kicked off with the Microfinance Law of 1999, which, according to CGAP, "provided a clear framework for the development of the industry."[112] Beyond regulatory support, the government, through *Le Fonds Hassan II*, capitalized the first MFIs. Today, Morocco's 13 MFIs are organized as non-profits and capitalized by commercial banks and DFIs. The top four MFIs by number of clients are *Zakoura, Al-Amana*, FONDEP, and ATTAWFIQ Microfinance (formerly FBPMC), controlling 90% of mobile money penetration. These organizations have a total of 890,000 clients and manage loan portfolios of US $553MM in aggregate. There are also a number of large money/payment transfer companies, including *Maroc Traitement de Transactions* and HPS.

MFIs only provide credit, and not traditional banking services, and innovation is sluggish. In 2008, following an eleven-fold increase in portfolio size between 2003 and 2007, large amounts of bad debt led to a microfinance crash. MFIs have been reappraising their strategies in the wake of this event. Recently, some MFIs have begun to deploy mobile money products, but traction has slowed down due to recovery from the microfinance crisis. It is likely that this sector is underexploited and deserves reappraisal.

CGAP believes that the 2008 crash was unconnected to the global credit crisis and instead, catalysts for the crash were related to lenient credit policies, obsolete management information systems (MIS), lack of internal controls, and substandard governance. In the wake of the domestic MFI crisis, the Moroccan government received funding for technical assistance to strengthen these institutions and introduced greater liquidity requirements.

In the commercial sector, BMCE Bank of Africa, which is one of the largest banks in Morocco, is building a clean energy portfolio. It has issued debt instruments for large-scale projects, mostly wind, totaling more than US $225 million. Earlier this year, BMCE Capital Gestion, its asset management entity, also launched the country's first socially responsible investment fund. There are also significant capital inflows from DFIs. In April 2015, a World Bank Clean and Efficient Energy Project (P143689) was a US $158.31MM loan funded to improve the capacity of the *office national de l'electricite et de l'eau potable* (national electricity and water utility company) (ONEE) to supply and dispatch clean electricity and to meet the demand of targeted customers more

[111] Flaming, M., Tarazi, M., and El Sayed, C. (May 2012). Country Report: Morocco. *IFC Mobile Money Scoping*.
[112] Reille, X. (1 January 2010). The Rise, Fall, and Recovery of the Microfinance Sector in Morocco. *CGAP*.

efficiently in the project area."[113] The first phase of the programme is designed to transition the financing of clean energy projects to the private sector. The second portion plans to increase grid-connected solar PV capacity. Other components of the program include smart metering, energy efficiency, and demand-side management projects.

Market Opportunities & Barriers

As an illustration of the RE market opportunities by 2050, the Solutions Project's vision for a 100% sustainable energy-powered Morocco proposes the largest share from solar power plants and onshore wind. This plan would generate an estimated 98,117 jobs, along with a number of co-benefits. The model pegs annual health costs at an estimated $47.8 billion per year (6.8% of GDP) and lower average electricity costs to an average of $0.09/kWh against $0.11/kWh in a BAU scenario. The total annual cost savings per person would reach $1,837—comfortably more than half of per capita GDP.

Residential rooftop solar	8.4%	**Commercial & gov't rooftop solar**	7.5%
Solar plant	45.9%	**Wave energy**	2%
CSP	5%	**Geothermal**	0%
Onshore wind	22.5%	**Hydroelectric**	3.7%
Offshore wind	5%	**Tidal turbine**	0.1%

There are two principal barriers to LSEE growth in Morocco. First, there is a social preference for grid electricity. Several years ago, the Moroccan government ran a program that subsidized 50% of the connection costs of solar PV systems. Despite this significant subsidy, few households participated because, according to anecdotal reports, people felt that off-grid power was a sign of being treated like a "second-class citizen" and that the adoption of decentralized PV would dis-incentivize the government from undertaking initiatives in the future to extend the national grid. Second, aside from a one-time connection fee of around $1,500, the kWh rate of $0.15 is relatively low. Combined with the fact that rural households typically make under $200 per month, the traditional LSEE approach, laden with credit risk, is less attractive. In this environment, the primary rural opportunities lie in financing connection fees for rural households.

Gender

Morocco's Constitution from 2011 enshrines men and women's equal rights (article 19) and the equal access of women and men to elective functions (Article 30). Consequently, the Governmental Plan for Equality (2012-2016) aims to promote gender equality and integrate women's rights in public policies and development programmes. Within the Ministry of Solidarity, Women's Affairs and Social Development, the Directorate for Women's Affairs, Equity and Gender is the body responsible for the coordination of equality and women's rights promotion programmes. Moroccan women have also created associations to defend their rights, such as for instance the Democratic Association of Moroccan Women, which promotes gender equality through public policies, laws and customs.

[113] Project Appraisal Document on a Proposed Loan in the Amount of US$125 Million and a Proposed Loan from the Clean Technology Fund in the Amount of US$23.95 Million. (3 April 2015). The World Bank Group/IBRD.

Even though men and women have the same rights on paper this is *de facto* not yet the case. Certain discriminatory cultural practices are continuing to exist and affect women's ability to access finance, entrepreneurship opportunities, education, knowledge and quality of life in the same way as men. Moroccan women have the same ownership rights to land as men, but tradition often limits those rights, particularly in rural areas. In addition, the percentage of women agricultural landholdersowners of land is particularly low.[114] When women own land, male relatives often manage it.[115] In addition, despite having the same right to access elective functions as men, Moroccan women hold only 14.35% of parliamentarian seats.[116]

With regards to access to financial services, women in Morocco have difficulty obtaining credit from traditional banks with the same conditions as men.[117] According to a World Bank survey from 2014, men are 20% more likely to access loans than women.[118] This is a serious issue as 17.10% of Moroccan households are female-headed households.[119] Lack of financial access is largely due to women's limited economic opportunities. The share of women-owned businesses in Morocco has been stagnating around 10-12%. Among them, 47% have a turnover of less than 4 million dirhams and 59% do not exceed 10 employees. In addition, women represent only 5.97% of board directors of the top 500 private companies in Morocco, a very low percentage far below the continental average of 12.7%, and over 60% of these companies have no women in their governing body. [120]

Gender-specific sustainable energy needs in Morocco include energy for cooking, heating, rural electrification especially for homes, schools, hospitals and street lighting. The Moroccan Global Rural Electrification programme aims to aims to achieve 99.7% of rural electrification during the period 2006-2016, with over 2,970 villages to electricity through solar equipment. Beneficiaries are women and children in homes, Schools, Health Centres, Agriculture, etc. The Wood Energy Programme aims to install improved stoves, using 5kg of wood instead of 20kg for old ones, in favorfavour of rural women. However, there is lack of specific support to women entrepreneurs and no specific initiative aiming to increase the ability of women to participate at decision-making levels in the energy sector.

Potential Gender-Responsive Strategies

Given the high grid penetration and consumer preferences for it, a successful SE strategy will complement grid capacity, rather than replace it. There are two primary opportunities for new,

[114] FAO Statistics, 1996: Gender and Land Rights Database, Distribution of agricultural holders by sex (Females) in Morocco. Available at: http://www.fao.org/gender-landrights-database/data-map/statistics/en/?sta_id=982&country=MA
[115] UN Women, Country Profiles, Morocco. Available at: http://spring-forward.unwomen.org/en/countries/morocco
[116] Women in Parliaments: World Classification, December 2015. Available at: http://www.ipu.org/wmn-e/classif.htm.
[117] Social Institutions and Gender Index (SIGI), 2014: Gender Equality in Morocco. Available at: http://www.genderindex.org/country/morocco.
[118] World Bank, 2014: Enhancing Financial Capability and Inclusion in Morocco - A Demand-Side Assessment. p.11. Available at: http://responsiblefinance.worldbank.org/~/media/GIAWB/FL/Documents/Publications/Enhancing-Financial-Capability-and-Inclusion-in-Morocco-FINAL.pdf
[119] Index Mundi, 2003: Countries ranked by Female headed households (% of households with a female head). Source: Demographic and Health Surveys by ICF International. Available at: http://www.indexmundi.com/facts/indicators/SP.HOU.FEMA.ZS/rankings
[120] African Development Bank, 2015: Where are the women: inclusive boardrooms in Africa's top listed companies? p.14. Available at: http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Where_are_the_Women_Inclusive_Boardrooms_in_Africa's_top-listed_companies.pdf

women-led enterprises in this environment: energy efficiency firms focusing on rooftop solar water heaters and net-metered mini-grids. Many advanced markets in OECD countries with similar grid penetration have added SE capacity with this approach. Morocco could pursue similar strategies to create local employment, bolster household budgets, and, at scale, also positively impact Morocco's national trade balance.

Solar hot water heater-centered energy efficiency businesses are comparatively easy to finance. The traditional approach allows consumers to realize a net savings on monthly energy bills while also creating bankable opportunities for firms. Because per capita consumption of hot water is likely to be higher in urban areas, this intervention could initially focus on urban markets. Energy efficiency firms can estimate the share of a monthly energy bill consumed by water heaters, replace grid-fed water heating with rooftop solar heaters, and provide asset financing for consumers below their typical monthly payments. Because energy use can be precisely calculated and is unlikely to change, these opportunities present little risk to debt providers. Because women are the primary energy managers in Morocco, this intervention is inherently well-positioned to leverage the comparative advantage of a women-led sales force. The gating issue will be the availability of asset financing.

The history of turbulence—including, importantly, its rebirth—in Morocco's MFI market makes it likely that there is robust institutional knowledge for risk management. Connecting the most competent institutions with capable management teams is the first step in driving growth in this sector. The core competency for entrepreneurs will be the initial credit screening. This could be performed by the MFI partner; alternatively, capacity could be transferred from MFIs to entrepreneurs.

A feed-in tariff law for individual connections or mini grids could generate a different type of opportunity for women entrepreneurs. A feed-in-tariff law provides secure payment streams from accredited off-takers, whether on-grid or off-grid. The experience of OECD countries shows that a feed-in tariff law for individual connections creates robust market opportunities for third-party service providers. For community-owned RE power production systems, an ideal situation would be a utility entering into contract with a SE project to buy power at a fixed rate for a fixed period of time (e.g. 20 years). Alternatively, the utility may be interested in directly financing or co-financing grid-connected capacity, particularly if the large centralized power systems are near capacity. The marginal cost of capacity is relatively high for centralized power systems, therefore it is sometimes more cost effective to add distributed capacity. Possible co-financers are MFIs, DFIs, and commercial banks are all potential investors. Regardless of the funding mix, it is critical to involve the utilities.

Added capacity, whether through solar water heaters or mini grids, which transforms energy consumers into producer-consumers yields a number of co-benefits. First, there is evidence that this transition provides a subtle behavioral "nudge" that makes consumers aware of their energy use and subsequently leads to reduced consumption. Second, it allows for bottom-up, incremental power sector growth that maximizes the economic benefit of land. Third, a distributed and meshed energy system provides a greater degree of energy security against brownouts and blackouts.

Myanmar

At around 30%, Myanmar has one of the lowest electrification rates in the world.[121] In rural areas, electrification reaches only 16% of households. However, the government has prioritized energy access and aims to achieve universal access by 2030 for all of its more than 50 million citizens. Combined with a population density of 82 people/km^2, more than double the density of the United States, this is an achievable target. The government has taken strong steps toward universal access by expanding the national grid by 15% per year for the last five years.

Old hydroelectric power stations supply the majority (70%) the power, with gas comprising 27%. The remaining three percent, estimated at 120 MW, comes from micro-hydro and diesel generators. Hydro stations profitably generate power at 35 to 50 kyat per kWh (roughly US $0.03 - $0.04).[122] New hydro or gas generation would have to charge between two to three times the local market rate to cover costs, with distribution line extension comprising a large portion of these costs. In this environment, LSEEs, which do not depend on expensive distribution infrastructure, stand to gain significant market penetration.

Myanmar's INDC draws a direct line between climate change and its socioeconomic development, noting that multiple studies have found it to be "the second most vulnerable country in the world to extreme weather events over the last 20 years." At the same time, it acknowledges that energy consumption (180 kWh per capita) is exceptionally low and GHG emissions will likely increase as demand for energy increases. However, it is willing to limit emissions and adds that Myanmar's vast tropical forests make it a net GHG sink. The INDC also contains a number of initiatives across EE (clean cookstove distribution and institutional capacity building for industrial energy efficiency) and RE (developing master plans to expand hydro distribution and deployment of off-grid solar). The INDC also states that Myanmar aims to include gender considerations in climate change policy design, though it does not name specific strategies for doing so.

Mobile Money & Finance

It is expected that the Central Bank of Myanmar will release the implementing regulations for mobile money platforms in 2016.[123] This development, in combination with a projection from telcos that they will reach 80-90% of the population within four years, promises to unlock major potential for LSEEs. The Myanmar government has already set a goal for 80% financial inclusion by 2020.[124] LSEEs could piggyback on this growth.

Energy access in Myanmar is also a priority for multilaterals. The World Bank has recently approved the National Electrification Project (P152936), a US $567MM program that addresses the electrification issue from several angles. The bulk of the money ($300MM) is allocated to procurement and project costs for grid extension, projected to reach 750,000 households, 11,600 health clinics, schools and other community buildings, and 132,000 public street lights.

[121] Myanmar: Off-Grid Renewable Energy Demonstration Project. (April 2014). Asian Development Bank. Retrieved from: http://www.adb.org/projects/47128-001/main

[122] Dapice, D. (6 November 2014). Electricity Supply, Demand and Prices in Myanmar – How to Close the Gap?. Harvard Kennedy School, Ash Center for Democratic Governance and Innovation.

[123] Government of Myanmar; Barton, J. (25 November 2014). Telenor readying mobile money with Yoma in Myanmar. *Developing Telecoms*.

[124] Shrader, L., and Htun, P. (22 January 2015). Setting the Stage for Mobile Money in Myanmar. *CGAP*.

Government and communities are expected to co-finance these projects. Another $20MM is designated for improving electrification policy and regulation, and other technical assistance efforts. A final segment of $80MM specifically targets off-grid electrification for "remote communities unlikely to receive grid access in the next 10 or more years." This portion of the financing will cover:

- solar photovoltaic devices or systems for a target of 456,500 households;
- mini-grids to serve some 35,500 households; and
- electricity connections for 11,400 health clinics, schools and other community buildings, and 19,000 public street lights.

The World Bank program document states that this off-grid access budget will function in parallel to the proposed IFC Lighting Myanmar Program, which, when launched, will provide "advisory services to help develop the commercial market for solar photovoltaic devices and kits in central Myanmar."

The Ministry of Electric Power and the Ministry of Livestock, Fisheries and Rural Development will jointly implement these projects. The MLFRD's Department of Rural Planning has its own Project Management Office exclusively focused on the off-grid portion of the project and the aspects of the technical assistance package that apply to off-grid energy. The DRP will have autonomy to deploy the funds, as long as they fall within the eligibility guidelines set out in the World Bank program document.

Another source of funding for LSEE projects is remittances, which are estimated to make up around 5% of Myanmar's GDP.[125] Coordination with diaspora communities can create new payment pathways for solar home systems in areas that are otherwise uneconomical to serve.

Market Opportunities & Barriers

The opening of Myanmar's economy is ushering in an unprecedented level of enthusiasm for Myanmar's economic prospects, and new capital inflows have the potential to rapidly reshape the energy sector. This makes forecasting trends is particularly challenging. The 2050 proposal for 100% sustainable capacity in Myanmar put out by The Solutions Project provides one potential path through the wilderness. It projects a significant decrease in the share of hydro, and growth mainly in various types of solar and wind projects. The decommissioning of gas power plants (currently, nearly a third of all capacity) and corresponding increase in new solar capacity necessary to achieve The Solutions Project's plan is unlikely. Nevertheless, the technology mix is useful as a thought starter on potential growth areas.

Residential rooftop solar	20.7%	**Commercial & gov't rooftop solar**	9.6%
Solar plant	34.4%	**Wave energy**	0.2%
CSP	5%	**Geothermal**	0%
Onshore wind	10%	**Hydroelectric**	7.8%
Offshore wind	12%	**Tidal turbine**	0.3%

[125] Russeau, S. (23 May 2013). Remittances Buoy Up Myanmar's Economy. *Inter Press Service*.

Significantly, Jacobson's all-sustainable energy simulation sees the unit cost of energy *rising* to $0.09/kWh against a $0.08/kWh BAU case. There are, however, significant upsides in other areas. Beyond the 92,080 jobs created, Myanmar would stand to save $133 billion in avoided health costs, which is equivalent to 13.5% of the country's GDP. The total per capita annual avoided costs would stand at $1,927, or about 150% of current GDP per capita. The favorable size of this ratio warrants a look at opportunities (through desk research of analogous situations) for the energy sector to capture value from avoided healthcare costs.

Growing the decentralized sustainable energy sector in Myanmar will require confronting the low tariffs of electricity from the grid. When rates are low, LSEEs must raise larger amounts of working capital so they can acquire new customers while keeping monthly payments low for current customers. Typically, investors are hesitant to finance lightly capitalized firms (i.e. those with a high debt:equity ratio). In addition to elevated financial risks, entrepreneurs will face uncertainty around Myanmar's underdeveloped off-grid energy regulatory frameworks.

Gender

The Myanmar National Committee for Women's Affairs (MNCWA), established in 19961995 by the Ministry of Social Welfare, is Myanmar's national entity working for the advancement of women. It is responsible for implementing the National Strategic Plan for the Advancement of Women stretching from 2013-2022. The objectives of the plan are to empower women to enjoy their rights with support by the government, and to establish systems, structures and practices for the advancement of women, gender equality, and the realization of women's rights.[126] In addition, the Myanmar Women's Affair Federation (MWAF) was created in 2003 to implement activities throughout the country to ensure the security and advancement of women.[127]

Women hold 13.2% of the seats in Myanmar's Parliament.[128] Despite legal provisions for equal economic rights and opportunities (Article 370, 2008 Constitution: the right of all citizens to be engaged in economic activities; Article 350: women's rights to equal pay),[129] only about 50% of women were undertaking income-generating activities in 2015 in comparison to 82% of men.[130] Moreover, women tend to be employed in lower-skilled labour and/or in lower-level posts.[131]

Women have lower access to financial services in Myanmar. In 2014, only 17% of women adults had an account at a financial institution in comparison to 29% of men did.[132] Improving women's

[126] Japan International Cooperation Agency, 2013: 'Country Gender Profile: Republic of the Union of Myanmar Final Report', p.i.. Available at: http://open_jicareport.jica.go.jp/pdf/12153441.pdf.
[127] *Ibidem,* p.ii.
[128] Women in Parliaments: World Classification, December 2015. Available at: http://www.ipu.org/wmn-e/classif.htm.
[129] Japan International Cooperation Agency, 2013: 'Country Gender Profile: Republic of the Union of Myanmar Final Report'.
[130] World Bank, Labor force participate rate, male/female (% of male/female population ages 15+) (modeled ILO estimate). Available at : http://data.worldbank.org/indicator/SL.TLF.CACT.MA.ZS and http://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS.
[131] *Ibidem.*
[132] World Bank, Financial Inclusion Data/ Global Findex, 2014: Account at a financial institution, female (%age 15+). Available at http://datatopics.worldbank.org/financialinclusion/country/myanmar

access to finance is crucial in the country, especially since 23.7% of households in Myanmar are female-headed.[133]

In Myanmar women are at the forefront of household but also other non-paid livelihood activities (e.g. collecting water, ensuring irrigation and feeding livestock). Since women's daily activities are closely related to energy usage, supporting their involvement and leadership on entrepreneurship activities in the context of clean energy is particularly promising.

Potential Gender-Responsive Strategies

Myanmar has an historic opportunity to create a basis for exponential future impact in its off-grid energy sector by making strategic decisions at this early stage in the sector's development. Because the sector is nascent, women are not competing with incumbents (in most cases, men) for positions within LSEEs. Myanmar can seize the opportunity presented by the World Bank's concessional financing for off-grid projects by attaching a gender requirement to the deployment of the funds. Involving women in these projects would lay a foundation of technical proficiency among women that would unlock potential for the first generation of LSEEs in the future. The Schneider Electric Foundation, which already has a donor programme for Myanmar, should be approached as a potential partner.

Building on this foundation, women will be able to fluidly step into LSEE roles and leverage their comparative advantages to drive decentralized solutions as mobile money regulations are introduced and additional affordable financing becomes available. Maximizing the sector's efficiency is particularly critical in the case of a fragile state such as Myanmar. A 2011 report from the IMF notes that aid to post-conflict areas is highest immediately after the conflict, when the state is least able to absorb aid, and drops off over time, paradoxically, as local institutions become more capable of effectively deploying aid.[134] If this trend holds true, aid inflows to Myanmar will peak in the coming years and so the government must act now to create local capacity.

Per Myanmar law, international companies must partner with local private companies

Engendered deployment of these initial World Bank funds should be complemented with deliberate regulatory interventions to remediate cultural barriers preventing women from participating in technical fields. These efforts can leverage existing programs. Myanmar already has an established process for maximizing local employment: international companies wishing to implement projects partner with townships, which then recruit talent from communities local to the project. Policymakers should execute a study of the gender disaggregated outcomes of these programs and craft specific interventions to address gender disparities that are uncovered. Policymakers should look to partner with existing civil society organizations, such as the Myanmar Women

[133] Department of Population Ministry of Immigration and Population of Myanmar, 2015: The 2014 Myanmar Population and Housing Census, The Union Report, Census report Volume 2, p1. Available at: Knoema, Myanmar Regional Statistics, 2013. Source: Ministry of Foreign Affairs of Myanmar. Available at: http://knoema.com/marpqmg/myanmar-regional-statistics-2013?tsId=1040050

[134] Macroeconomic and Operational Challenges in Countries in Fragile Situations. (15 June 2011). IMF, Strategy, Policy, and Review Department.

Entrepreneurs Association. The government has also expressed an interest in specific capacity building activities, such as gender awareness training for stakeholders, technical training for women, and business skills mentoring. Throughout these initiatives, opportunities to use learning from these processes to mainstream gender in energy policy should be explored.

According to the National Electrification Plan, Village Electrification Committees, with 50% participation from women will be established to perform operations and maintenance functions. This provides an important entry point for increasing women's engagement in the sustainable energy sector.

Simultaneously, the programme will create a roster of remittance companies capable of providing payment pathways for local LSEEs. Local women entrepreneurs will have preferred access to these remittance companies for partnerships to grow LSEEs beyond the geographical boundaries of the World Bank facility.

Information and communication will be important to reach women, particularly in rural areas.

Senegal

Energy Sector

According to a 2012 report from IRENA, most of Senegal's electricity capacity comes from diesel-run generators operating beyond their design life span, and distributed on a poorly maintained and aging grid.[135] The relatively high cost of electricity to consumers excludes funding grid expansion, maintenance, or replacement with increased tariffs. This leaves the energy sector dependent on external support and subsidies from public finance to maintain an affordable electricity tariff for consumers. Further, all fossil fuels are imported, exposing the Senegalese economy to price volatility. Since the 1970s, Senegal has subsidized LPG in various ways to keep prices for consumers stable so that the country can reduce its reliance on biomass fuels. With the subsidies becoming a growing burden on national accounts and described as a "successful but not sustainable" way to reduce reliance on biomass fuels[136], in 2009, the government removed all LPG subsidies. Biomass still accounts for 54% of energy consumption.

While Senegal has a high potential for solar, wind, and hydro power, sustainable energy currently has a low share of total energy capacity in the country. (REEEP estimates that coal and hydropower combined account for 6% of capacity, wood and oil fuels comprising much of the remainder.[137]) The government is aggressively pursuing solutions, including a number of Public-Private Partnership agreements that are expected to increase the share to 20%.

The current national energy plan targets improved management and investment strategies. As part of this plan, Senegal announced a US $583MM investment next year. The primary goals are to diversify the sources of electricity, including the addition of 100 MW of solar capacity, and to

[135] Senegal: Renewables Readiness Assessment. (2012). *International Renewable Energy Agency*

[136] Laan, T., Beaton, C., and Presta, B. (2010). Strategies for Reforming Fossil-Fuel Subsidies: Practical lessons from Ghana, France and Senegal. *Untold billions: fossil-fuel subsidies, their impacts and the path to reform*.

[137] REEEP Policy Database. Retrieved from: http://www.reeep.org/policy-database

expand regional connectivity, renewing a commitment to rural electrification that includes a targeted increase from 30% in 2014 to 60% by 2017.

In a June 2015 program document for a US $50MM credit facility, the World Bank advised that "reducing and better targeting energy and agriculture subsidies" could put economic growth on the right track, while also noting that the government that came into power in 2012 has been turning the country around, as proven by Senegal's improved rankings in Doing Business report and the Corruption Perceptions Index.

Senegal's INDC contains energy sector commitments to improving energy supply chain infrastructure, energy efficiency, and the reduction of emissions (unconditional 6% reduction, and conditional 31% reduction by 2030). It disaggregates commitments by sector, and contains additional emissions reduction commitments in the industrial, agricultural, forestry, and waste sectors. The INDC's only engendered goal is deploying modern energy to reduce the household workloads of women ("*Utilisation des formes d'énergies modernes dans les foyers allégeant ainsi la charge de travail des femmes*").

Mobile Money & Finance

Senegal is an overwhelmingly cash-based economy, with estimates pegging the unbanked at between 64% and 94% of the total population.[138] Despite persistent financial and administrative barriers to traditional banking, there have been interesting approaches to alternative banking services relevant to the LSEE model.

MyAgro, a social enterprise that works with smallholder farmers in Senegal, uses mobile money technology to create a savings platform for asset finance (rather than the typical loan play). The platform allows farmers to pay for farm inputs in incremental payments. Using a layaway model, customers purchase payment cards worth between $1 and $25 to send digital payments to myAgro until the product is fully paid. The program has mixed results: approximately one third of farmers do not complete their payments in time for the planting season. (According to research from CGAP and Dalberg's Design Impact Group, the largest determinant on full payment is the likelihood that the farmer makes the second payment, two weeks after beginning the program.)

Significantly, CGAP found that the majority of the smallholders in Senegal were illiterate and primarily used their phones to send and receive calls. "As a result," the report reads, "they struggled to interact with the myAgro layaway platform, which uses SMS messages to add credit to layaway accounts and send balance notifications to customers."[139]

A more successful product has come from Senegalese entrepreneurs operating in more than 40 countries under the brand *Wari*. *Wari*, allows customers to achieve digital financial services and mobile money-like functionality through a network of more than 27,000 sales agents in Senegal, who together see an average daily volume of 700,000 transactions.[140] *Wari* initially focused on cash-to-cash transfers, bills payments and airtime conducted by service point operators for the

[138] World Bank Global Findex Database. Retrieved from: http://datatopics.worldbank.org/financialinclusion/
[139] Mattern, M., and Tarazi, M. (2015). Designing Digital Financial Services for Smallholder Families. *CGAP*.
[140] Williams, S. (28 July 2014). Wari: Boosting financial inclusion. NewAfrican. Retrieved from: http://newafricanmagazine.com/wari-boosting-financial-inclusion/; and Government of Senegal.

client, which eliminated the need for savings accounts. This replicated the just-in-time transactions of a cash-based economy, and did not require client literacy. However, both the persistence of the telecoms-based mobile money service, Orange Money, and the introduction of close to a dozen new competitors in the past two years have spawned rapid changes in the market, notably decreasing transaction fees, introducing new bill payment and savings services, and a rapid influx of dependent third-party services, including health micro-insurance and social security payouts.

At a macro level, in a Moody's analysis of 29 frontier markets (defined as those "sub-investment grade countries that rely primarily on concessional financing"), Senegal was one of the few frontier markets predicted to move up the ratings table in the coming years. If this does indeed happen, it would allow local firms, particularly those benefitting from credit enhancements, to look beyond both microfinance and DFI instruments to significantly larger commercial bank balance sheets.

Market Opportunities & Barriers

The World Bank pegs Senegal's electrification rate at 56.5%, leaving significant white space for sector growth. As an illustration of one strategy for achieving 100% access to sustainable energy by 2050, The Solutions Project proposes the following technology mix:

Residential rooftop solar	18.5%	**Commercial & gov't rooftop solar**	9%
Solar plant	34.2%	**Wave energy**	2%
CSP	10%	**Geothermal**	0%
Onshore wind	20%	**Hydroelectric**	1%
Offshore wind	5%	**Tidal turbine**	0.3%

According to this analysis, some of the co-benefits of a full transition would be the creation of 15,756 jobs, a drop in the unit cost from roughly $0.12/kWh under BAU to $0.09/kWh, and annual savings of US $95.5 billion in avoided health costs (53.3% of GDP). By 2050, the total annual per capita benefit of health and energy avoided costs would amount to $3,660. All but $15 of this amount would come from avoided costs, mainly in health. An energy strategy could integrate a health lens, and ideally find a strategy that coordinates health sector investment with energy investment.

Government officials have cited access to finance and technical capacity as barriers to off-grid energy sector growth. The limited supply of these skills makes it more difficult to create investment-ready opportunities. Additional barriers include high taxes for solar hardware and LPG subsidies. (Eliminating LPG subsidies will require politicking within the West African Economic Union, and the influence of WAEU over Senegal's tariff policies creates investment risk.) This combination of a weak enabling environment and highly subsidized incumbent fuel sources limits the opportunities for market-driven LSEE growth. However, more than two thirds of Senegal's poor live in rural areas and a successful strategy must overcome these obstacles.

While mobile money service providers have fewer regulations than their traditional bank counterparts, their immediate limitations are primarily infrastructural. Service points close or operators change affiliated providers based on promotions and service reliability. Limited technical capacity to ensure database security and oversee new service rollouts and system updates leave providers and their clients vulnerable to both outages and personal losses. Technical

requirements of new provider services could soon require the majority of remote service point operators using GPRS to convert to more costly internet-connected terminals.

Gender

Senegal's 2011 Constitution guarantees equality between men and women (article 7). The Ministry of Women, Family and Children is responsible for ensuring this gender equality goal. To address this challenge, a National Strategy for Gender Equality and Equity was implemented between 2005 and 2015, and two institutional mechanisms, the Directorate for Gender Equity and Equality (DEEG) and the National Observatory on Parity (ONP), were established. A Senegalese Gender Parity law, requiring that at least half of the candidates of political parties in local and national elections are women, was adopted in 2010. As a result, the number of parliamentarian seats held by women (42.7%) is relatively high.[141]

However, discriminatory practices, especially in the context of family and inheritance, persist. In particular, rural areas are still dominated by some customary and religious practices which discriminate against women[142]. Under the Senegalese Constitution, women and men have equal property rights, but in practice discriminatory customary practices continue to limit women's access to land ownership.[143] Similarly, women and men enjoy the same legal rights to own bank accounts and access bank loans according to article 374 of the Family Code, but in reality women often struggle to obtain loans.[144] Since women have less access to ownership, their collateral, needed to obtain loans, is significantly lower than that of men. In 2014, only 8% of women in Senegal had a bank account in comparison to 16% of men.[145] At the same time, 29,4% of households in Senegal are female-headed.[146]

In Senegal, women have the primary responsibility for domestic tasks in the household, including domestic fuel supply. Senegal has started initiatives to reduce the domestic care burden of women and introduced butane gas stoves and biomass charcoal briquettes. For instance, the Promotion Programme of Rural Electrification and Domestic Fuels Supply (PERACOD) contributes to the reduction of women's work in terms of time devoted to the supply of domestic fuels. This reduction is a prerequisite to enable the participation of women and girls in income-generating activities. The vast majority of gender-specific barriers to women's entrepreneurship and leadership in clean energy however still remainremains to be effectively addressed in the country.

Potential Gender-Responsive Strategies

Senegal's steadily growing economy, bolstered by optimistic sounds from credit ratings agencies, and growing mobile money sector paint a sunny picture for the future of Senegal's off-grid energy

[141] Women in Parliaments: World Classification, December 2015. Available at: http://www.ipu.org/wmn-e/classif.htm.
[142] Amnesty International Annual Report 2009 : The State of the World's Human Rights. p.6. Available at: http://www.amnesty.org.au/images/uploads/about/ai_report_09.pdf
[143] Japan International Cooperation Agency (JICA), 2007: Senegal Country Gender Profile, p.21. Available at: http://www.jica.go.jp/english/our_work/thematic_issues/gender/background/pdf/e07sene.pdf
[144] World Bank, 2013: Women, Business and the Law - Creating Economic Opportunities for Women; Kane, Safietou, 2013: Women and Development in Urban Senegal: Microcredit and Social Capital African Sociological Review Vol 17(1): 45-64.
[145] World Bank, Financial Inclusion Data/ Global Findex, 2014: Account at a financial institution, female (%age 15+). Available at http://datatopics.worldbank.org/financialinclusion/country/senegal
[146] World Bank Statistics, 2014: Female headed households (% of households with a female head). Available at: http://data.worldbank.org/indicator/SP.HOU.FEMA.ZS

sector. Despite its emerging market status, according to the US Department of State, Senegal remains attractive for FDI. The currency, the CFA Franc, is a stable currency, pegged to the Euro and guaranteed by the French Treasury. Senegal and the US are also under a bilateral investment treaty. Most significantly for attracting foreign commercial investors, Senegal largely accepts binding foreign arbitration of investment disputes. However, Senegal will depend on concessional financing until purchasing power and per capita consumption rises.

At this critical stage, as Senegal's sustainable energy sector progressively scales, it is critical to both involve women in the formulation of off-grid sector policy. The Ministry of Energy & Renewables Energy Development should identify a liaison to periodically convene financial partners (both commercial banks and DFIs), businesswomen, and policymakers to identify opportunities for improvement and growth. The community liaison would be responsible for ensuring that there are women representatives at the table for all major energy sector decisions that do not directly relate to off-grid solar. The liaison should have experience in regional diplomacy and policymaking, and represent the interests of women entrepreneurs to representatives at the West African Economic Union.

The absence of technical skills is another major focus. Knowledge of the benefits of sustainable energy technology and reliable installers are both difficult to come by outside of Dakar.[147] This programme will address these deficits through a training program that prepares women entrepreneurs to market, sell, and install solar home systems. Solar home systems are the preference of the DFI community, making it an attractive target for follow-on funds, and a technology that requires minimal technical knowledge. This will provide a baseline understanding of how to market products and manage supply chain, while familiarizing a vanguard of businesswomen with a basic understanding of the properties of sustainable energy technologies.

Adapting solar home systems to a service point-based payment system, to accommodate consumer preferences for cash transactions, is critical to the success of this effort. There are a small number of manufacturers that provide hardware add-ons that enable agent-based payment gateways, rather than traditional direct-from-consumer mobile payments. Providing market-appropriate subsidies to enable access to these technologies should be a priority.

The beachhead markets for these trainings will be identified in an initial market research assessment. These markets will be selected primarily based on the best available mixes of the presence of productive industries, population density, and distance from the power grid. (Care should be taken to avoid redundancy with the Ministry of Energy & renewable energy development plan to install 392 mini-grids in rural areas.) Encouraging sustainable energy sector growth around productive industries, regardless of whether or not the initial products directly support industry, will serve as an important awareness-raising tool.

[147] Severi, L., and Bronckaers, J. (August 2012). What is holding back solar energy development in Senegal?. *African Energy Journal*.