LEVERS OF CHANGE:

HOW GLOBAL TRENDS IMPACT GENDER EQUALITY AND SOCIAL INCLUSION IN ACCESS TO SUSTAINABLE ENERGY

ENERGIA
INTERNATIONAL NETWORK ON GENDER & SUSTAINABLE ENERGY

SUSTAINABLE ENERGY FOR ALL

UKaid
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Headquarters
Andromeda Tower 15th floor
Donau City Strasse 6
1220, Vienna, Austria
Telephone: +43 676 846 727 200
www.SEforALL.org

Satellite Office
1750 Pennsylvania Ave. NW
Washington, DC 20006 USA
Telephone: +1 202 390 0078

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COVER PHOTO: Two women in Burkina Faso use a solar-powered rice drying unit to mill rice.

NOTE: The other photos in this report were provided by ENERGIA

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Research Lead and Author: Rebecca Pearl-Martinez
Project Managers: Jane Olga Ebinger (SEforALL), Annemarije Kooijman (ENERGIA), Caroline McGregor (SEforALL), Fiona Messent (SEforALL)
Data Analysis Support: Aamina Teladia (SEforALL)
Project Support: Maeve Hogel (SEforALL)
Editor: Paula Keogh
Graphic Design: Natalie Lanham-Parker, Rebecca Titcomb
Steering Committee: Jane Olga Ebinger (SEforALL), Annemarije Kooijman (ENERGIA), Youba Sokona (ENERGIA Technical Advisory Group), Elizabeth Cecelski (ENERGIA Technical Advisory Group), Zdenka Myslikova (Tufts University), Joni Seager (Bentley University), Fiona Messent (SEforALL), Rebecca Pearl-Martinez (Research Lead)
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FOREWORD

Many significant global trends are underway that could catalyze bigger, faster gains in closing energy access gaps around the world. Among these trends: Rapidly declining technology costs are making decentralized renewable energy a faster, more affordable option for delivering electricity to remote under-served areas. The proliferation of mobile phones is opening up opportunities for mobile finance, which remote populations can use to gain access to renewable energy and clean cooking solutions. Women's business ownership activity is increasing in many developing countries, and it's showing strong promise to help close energy gaps in 'last-mile' areas that won't be reached with business-as-usual approaches.

Yet, in too many instances, women do not have the same opportunities as men to take advantage of these emerging opportunities and trends that can help deliver bigger, faster energy access for marginalized populations that most need it. Study after study shows that women have fewer opportunities than men to own mobile phones, gain access to financing or even have a voice in household decision-making on energy matters. As a result, women in developing countries are being impacted in far bigger numbers than men by energy poverty, extreme poverty and adverse climate change impacts.

To achieve universal access to sustainable energy by 2030, as called for under Sustainable Development Goal 7, no one can be left behind. Delivering sustainable energy to all women, men, and their children requires new energy access approaches to reach those who would otherwise be reached last, first. And these approaches need to have a bigger focus on gender equality in both the delivery of and the beneficiaries of sustainable energy services.

This scoping report provides a scan of a half-dozen key global trends that can drive – or hamper – women's participation in the global energy access movement, both in delivering sustainable energy solutions and in gaining access to sustainable energy. These trends include: growing decentralization and affordability of solar and other renewable energy services; growing use of mobile money/payments; increasing rates of women's entrepreneurship; proliferating urbanization; and fast-growing displaced populations living in humanitarian camps.

The report catalogs how these trends are playing out in key developing regions in terms of impacts and challenges women are facing, as well as their participation – or lack of it – in sustainable energy efforts. The report also looks closely at how these trends are playing out in five key countries – Nigeria and Tanzania in Africa, Bangladesh and Myanmar in Asia and Haiti in the Caribbean – which all face significant energy access challenges.

By analyzing these trends in national contexts, we hope the report will help government policymakers formulate and fine-tune energy access strategies so that they can achieve maximum benefits for men and women alike.

The report, *Levers of Change: How Global Trends Impact Gender Equality and Social Inclusion in Access to Sustainable Energy*, provides powerful evidence of how women are often not given an equal chance to take advantage of some of the key trends. For example, while solar off-grid and mini-grid systems are often the lowest-cost option for closing energy access gaps in Sub-Saharan Africa, many poor women live outside formal financial systems, including access to consumer finance, that would enable them to finance a solar home

system or a clean cooking stove. Another indicator of this challenge: While global access to mobile phones is increasing, women living in low- and middle-income countries are 10 percent less likely than men to own a mobile phone.

The report also showcases how countries are taking specific actions to take bigger advantage of these trends, both for expanding energy access for their overall populations and for women in particular.

Tanzania stands out with strong gender policies across multiple sectors, including energy, and a thriving off-grid solar home system market backed by a strong mobile money system. Bangladesh is on a path to reach universal electricity access by 2030, thanks largely to solar home systems that have been deployed with the help of government subsidies and loans. These efforts have produced numerous positive gains for women and girls, such as reduced kerosene consumption, reduced time collecting fuel and increased time for schoolwork after dark. Nigeria's pay-as-you-go solar market is trying to open up, but the country's banking sector is making it difficult for rural populations to access mobile money that would enable energy access.

We hope that this scoping report will help identify barriers and opportunities for taking bigger advantage of global trends that offer promise to achieve faster, broader gains on energy access – especially for women who are often being overlooked and left behind in the sustainable energy transition.

At Sustainable Energy for All, we are eager to work with governments, business, civil society and grassroots groups to help steer national and regional strategies down a path that embraces energy access for all. Much of this engagement will be done through the People-Centered Accelerator, our global partnership initiative, aimed at advancing and strengthening gender equality, social inclusion and women's empowerment across the vast global energy value chain. By engaging and convening these diverse partners, we hope to turn these goals – and the broader SDG 7 goals – into reality.

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EXECUTIVE SUMMARY

To achieve universal energy access, no one must be left behind. Closing the global energy access gap means reaching the 1.06 billion people worldwide who do not have electricity and the 3.04 billion people who do not have clean cooking solutions.[1] Delivering on universal energy access, through the 2030 Agenda for Sustainable Development, will require approaches to reach those who would otherwise be reached last, first. Women in developing countries—who make up the majority of those living in extreme poverty—are the hardest hit by energy deficits as well as by the impacts of climate change.

Achieving gender equality in energy access will be impacted, driven, or hampered by several upward trends: the decentralization of energy services, affordability of energy services, mobile payments, women's entrepreneurship, urbanization, and humanitarian settings. This scoping report provides a scan of these trends from both a global perspective and in the context of five countries: Nigeria and Tanzania in Africa, Bangladesh and Myanmar in Asia, and Haiti in the Caribbean. Analyzing each of these trends in the national context will help policymakers propel energy access strategies from the perspective of how they would be best designed and deployed to reach both men and women.

TABLE 1: SUMMARY OF TRENDS AND IMPLICATIONS

Trend	Implications for gender equality and social inclusion
Decentralization Energy services are increasingly decentralized.	The expansion underway of off-grid and mini-grid energy access solutions presents new opportunities to close gender and social inclusion gaps by reaching those not served by the grid.
Affordability Energy services are increasingly affordable.	With improving technology and increasing scale, energy services are becoming less expensive and consumer financing packages from DRE companies help to put connections within reach.
Mobile payments Access to mobile payments is expanding.	Mobile money and other digital innovations can be leveraged to propel women's access to off-grid and clean cooking solutions, as well as their entrepreneurship.
Entrepreneurship Women's business ownership is on the rise in many countries.	The upward trend in women's entrepreneurship is an opportunity to expand energy access by empowering women to help close the access gap at the last mile, reaching those who wouldn't be reached by business-as-usual approaches.
Urbanization The world's population is increasingly urban.	Securing reliable electricity and clean cooking access for women and men living in slums and peri-urban areas enables livelihoods, as well as the legitimacy and economic contribution of urban settlements.
Humanitarian settings More people are living in humanitarian aid settings.	With the growing crisis of displaced persons, humanitarian agencies can deliver improved service to residents by shifting away from reliance on expensive diesel-generated power toward renewable-powered electricity and by providing clean cooking solutions to pre-empt the need for residents to collect firewood.

[1] *These energy access figures date to 2014, published in the 2017 GTF. For the latest data see https://www.seforall.org/global-tracking-framework.*

TREND 1—DECENTRALIZATION

ENERGY SERVICES ARE INCREASINGLY DECENTRALIZED.

While grid extension powered by fossil fuels dominated the expansion of electricity through 2012, decentralized renewable energy solutions are expected to provide the majority of new access by 2030 (IEA 2017a). Growing evidence establishes that decentralized systems can drive women's use of energy for productive purposes and economic empowerment. And decentralized technologies extend the benefits of energy services—including reduced drudgery, time savings, and health and safety—to women in remote areas (Nelson and Kuriakose 2017). New modes of financing and policy that are appropriate to the smaller and more diverse nature of a decentralized energy supply are needed. In parallel, attention should be directed to the ability of women and those at the last mile to access energy services (Practical Action 2017).

TREND 2—AFFORDABILITY

ENERGY SERVICES ARE INCREASINGLY AFFORDABLE.

The declining price of renewable energy technologies, combined with the increased energy efficiency of appliances, has significantly reduced the cost of delivering electricity from these sources. For instance, LED lights dramatically reduce the price of lighting as an energy service. The least-cost solution for providing energy access to three-quarters of those in Sub-Saharan Africa is through decentralized options, particularly solar off-grid and mini-grid systems (Glemarec et al 2016). For many poor women, access to consumer finance is constrained by the additional hurdle of being outside the formal financial system, lack of access to mobile payments, and not having control over household decision-making (Demirguc-Kunt 2014). The upfront cost of high-end cooking appliances as well as alternative fuels has been a major barrier in the achievement of clean cooking solutions (World Bank 2014). Achieving universal energy access will require policies that address not just the energy sector but also banking, financial, and infrastructure policies that lower the cost of grid and off-grid electricity, and clean cooking solutions (Pachauri et al 2013).

TREND 3—MOBILE PAYMENTS

ACCESS TO MOBILE PAYMENTS IS EXPANDING.

While global access to mobile phones is increasing, a substantial gender gap remains in low-income and middle-income countries, where women are 10 percent less likely than men to own a mobile phone, a gap of 184 million fewer women than men (GSMA 2018). Mobile finance can help women access energy products and services, as well as agricultural sector services. For women entrepreneurs in developing economies, digital commerce and other technologies can overcome limited access to finance, time constraints, mobility, and skills and training (UNCTAD 2017). Access to mobile finance also enables women to invest in businesses and pay for their families' education and health needs (Lewis et al 2016). Expanding women's access to mobile finance has the potential to expand local markets and reach more of those without access to electricity and clean cooking solutions (IEA 2017a).

TREND 4—ENTREPRENEURSHIP

WOMEN'S BUSINESS OWNERSHIP IS ON THE RISE IN MANY COUNTRIES.

Globally, the number of women engaged in entrepreneurial activities is growing steadily, although Sub-Saharan Africa and the Middle East are lagging behind other regions (Mastercard 2018). Women who build businesses are overcoming greater bottlenecks than their male peers, including lack of financing, regulatory restrictions, discriminatory cultural and gender norms, lower levels of education and business

experience, and competing demands of household and family responsibilities without access to child care (Mastercard 2017; Global Entrepreneurship Monitor 2017). To propel energy access, policymakers need to create a business and regulatory environment that supports women's small and medium businesses (Global Entrepreneurship Consortium 2017). Entrepreneurship in decentralized energy could become a major source of income generation for women, especially at the base of the energy ladder but also farther up the value chain (Pearl-Martinez and Stephens 2016; Glemarec et al 2016).

TREND 5—URBANIZATION

THE WORLD'S POPULATION IS INCREASINGLY URBAN.

By 2030, about 60 percent of the global population will live in cities. Slum dwellers in cities already make up one-third of the world's urban population (UNDESA 2014; UN-Habitat 2010). In the fastest growing cities, electricity supplied may be enough for households to power phones, lights, and computers, and provide fuel for cooking, but it is not enough for productive activities (Putti 2011). To secure electricity services, policymakers need to circumvent tenure and payment barriers for women and men living in slums and peri-urban areas. Subsidized tariffs must be designed to ensure affordability for those most in need, particularly female-headed households. Alternative financing arrangements to alleviate upfront costs can include monthly installments and prepaid connections. To facilitate legal connections to electricity and liquefied petroleum gas (LPG) for those without proof of land or property ownership, agencies should accept alternative forms of proof of address. Providing energy beyond basic needs—for productive uses and for street lighting—will drive women's income generation (Singh et al 2014; Heinrich Boll Stiftung 2016).

TREND 6—HUMANITARIAN SETTINGS

MORE PEOPLE ARE LIVING IN HUMANITARIAN AID SETTINGS.

The number of people who are forcibly displaced has nearly doubled in the past two decades, up to 65.6 million people as of 2016 (UNHCR 2016). Consequently, the number of people living in humanitarian camps has expanded to 8.7 million, most of whom have minimal if any access to modern energy, relying on collected firewood for cooking (Lahn and Grafham 2015). Access to modern fuels—particularly for cooking in humanitarian settings—is a matter of protecting women's and girls' lives, as firewood collection for household energy is one of the most dangerous tasks they must undertake (GACC 2014). Equitable access to sustainable energy should become a formal component of humanitarian aid. To start, international policy frameworks, humanitarian organizations, and national governments need to adopt coordinated energy access goals and guidelines for displaced people (Lahn and Grafham 2015), ensuring that women's needs are assessed and clearly articulated.

ABBREVIATIONS

DRE	Decentralized Renewable Energy
GACC	Global Alliance for Clean Cookstoves
GOGLA	Global Off-Grid Lighting Association
ICRW	International Center for Research on Women
UNHCR	UN High Commission for Refugees
IEA	International Energy Agency
IFC	International Finance Corporation
IRENA	International Renewable Energy Agency
LED	Light-emitting diode
LPG	Liquefied Petroleum Gas
NDCs	Nationally Determined Contributions
NGO	Non-Governmental Organization
OECD	Organisation for Economic Co-operation and Development
PAYG	Pay-As-You-Go
PV	Photovoltaic
SDGs	Sustainable Development Goals
SEforALL	Sustainable Energy for All
SME	Small and Medium Enterprises
STEM	Science Technology Engineering and Math
UN	United Nations

I. WHY GENDER EQUALITY

AND SOCIAL INCLUSION MATTER TO ENERGY ACCESS

THE GLOBAL ENERGY ACCESS GAP IS GENDERED

Achieving a just and equitable transition to a sustainable energy system will rest on efforts to address gender inequality. To close the global energy access gap, governments and other actors need to reach roughly 1 billion people worldwide who do not have electricity and roughly 3 billion people who do not have clean cooking solutions. In developing countries, women who make up the majority of those living in extreme poverty are the hardest hit by energy deficits and the impacts of climate change.

LEVERAGING THE SUSTAINABLE DEVELOPMENT GOALS

Through the 2030 Agenda for Sustainable Development, governments committed to leave no one behind and to prioritize those furthest behind in achieving the Sustainable Development Goals (SDGs). Linkages between the SDGs give light to an overall agenda committed to addressing gender inequalities in energy access. Universal access to affordable, reliable, sustainable and modern energy, SDG 7, is a fundamental component of achieving SDG 1, ending poverty in all its forms everywhere. Both of these goals are linked to SDG 5 on women's rights to economic and natural resources, the enhanced use of enabling technology, and the prevention of violence against women and girls. Also related are SDG 13 on climate change action and the Paris Agreement, which recognized the intersection of climate change and gender equality.

GENDER INEQUALITY IN IMPLEMENTATION OF SUSTAINABLE DEVELOPMENT GOALS

While significant activity is already underway at the intersection of these goals, addressing gender equality is not always at the forefront. In voluntary reviews of how the SDGs are being implemented, governments report on developing renewable energy sources and connecting households to the energy grid in rural areas, but are encountering challenges in the high upfront cost of modern energy and addressing energy deficits in remote areas. Governments also emphasize legal and institutional mechanisms that exist to support women's rights, and the need to integrate a gender perspective in policy and budgeting, but report that such efforts are stymied by the low number of women in decision making in the public and private spheres and prevailing social norms that perpetuate gender inequality (UN-DESA 2017).

GENDER INEQUALITY IN IMPLEMENTATION OF GLOBAL CLIMATE AGREEMENT

Following the Paris Agreement, countries outlined post-2020 actions to reduce emissions, many of which charted complementary efforts to enhance energy access. More than half of the Nationally Determined Contributions (NDCs) submitted by Sub-Saharan African countries recognize the importance of affordable and reliable energy access to development. Specific electrification and clean cooking targets are noted in the commitments

of 15 African countries, including renewable options such as small solar lamps, solar home systems, and mini-grid extensions. Over 90 percent of NDCs prioritize increasing the share of renewable energy, primarily hydropower and solar (IEA 2017a). Only 40 percent of the NDC submissions reference gender equality or women. However, among these countries only a few highlight the participation of women in energy decision-making and in sustainable energy programs and training (UNDP 2016).

REORGANIZING ENERGY DELIVERY AROUND GENDER EQUALITY

It is clear from the national rollout of these international agreements on sustainable development and climate change, and the research carried out for this report, that more attention must be directed toward gender equality. Bridging the gender gap in access to sustainable and modern energy is not primarily a question of technology. It is also a question of organizing energy delivery in a way that navigates existing discrimination and responds to the central roles played by women and those on the margins of society. The prevailing investment approach to energy access is not organized to address these realities and thus perpetuates gender and social inequalities (Ngum 2016). The results of this are palpable—countries experiencing higher levels of gender inequality also have lower levels of electricity access (Deloitte 2015).

THE BROADER CONTEXT OF SOCIAL INCLUSION

This report focuses on gender equality—where women and men are treated and perceived to be equal—as one form of social inclusion. Gender-based inequalities are often described as the most widespread form of inequality (Coontz and Henderson). Both concepts of gender equality and social inclusion have been gaining ground as essential components of achieving universal energy access. SEforALL's People-Centered Accelerator promotes the inclusion of women and the poorest people in society within efforts to achieve universal access to sustainable energy services. Employing a social inclusion lens helps to identify excluded groups that are often denied opportunities and to monitor how global transitions are exacerbating forms of exclusion or creating new opportunities for inclusion. Most importantly for the purposes of this report, social exclusion is not immutable and with concerted effort can be significantly transformed (World Bank 2013). While the report focuses on gendered exclusion, there are broader examples of social exclusion throughout, for example communities living in remote areas or at the "last mile," or in insecure environments such as slums and humanitarian settings.

WOMEN'S NEEDS AND ROLES IN ENERGY ACCESS

Women, as the primary energy managers in households, are economic actors positioned to drive economic growth if afforded equal access to financial support and other opportunities, and are uniquely networked with energy consumers in poor households and at the last mile. Attention is needed to break down the broader barriers women and marginalized communities face in accessing land tenure and financial services, and to address extreme vulnerability to climate-induced weather events and indoor air pollution. Without access to clean cooking solutions, millions of women and children face significant illness and premature death. In addition to the devastating impact on quality of life and wellbeing, women and girls are forced to divert multiple hours per day collecting biomass for cooking, time that could be spent on educational and productive activities (Duflo et al 2008).

WHY TRENDS MATTER

We live in a world of rapid, significant, and disruptive change. Policymakers are tasked with keeping pace with this change through the innovative solutions they envision and implement for their countries. Securing access to electricity and clean fuels and cooking technologies for all—both women and men, and at the last mile—now requires consideration of energy systems that are not always connected to the grid, whether consumers can afford to pay for energy, and the role played by digital technologies. The growing awareness and investment in women's economic potential could be transformative for expanding energy access. And delivering energy to the growing number of people living in insecure environments—such as urban informal settlements and humanitarian situations—necessitates elevated attention, innovation, and a targeted approach. Each of these are a global trend, or general direction in which a social or economic or technological factor is developing or changing,[2] to which advanced approaches to energy access must respond.

TABLE 1: SUMMARY OF TRENDS AND IMPLICATIONS

Trend	Implications for gender equality and social inclusion
Decentralization Energy services are increasingly decentralized.	The expansion underway of off-grid and mini-grid energy access solutions presents new opportunities to close gender and social inclusion gaps by reaching those not served by the grid.
Affordability Energy services are increasingly affordable.	With improving technology and increasing scale, energy services are becoming less expensive and consumer financing packages from DRE companies help to put connections within reach.
Mobile payments Access to mobile payments is expanding.	Mobile money and other digital innovations can be leveraged to propel women's access to off-grid and clean cooking solutions, as well as their entrepreneurship.
Entrepreneurship Women's business ownership is on the rise in many countries.	The upward trend in women's entrepreneurship is an opportunity to expand energy access by empowering women to help close the access gap at the last mile, reaching those who wouldn't be reached by business-as-usual approaches.
Urbanization The world's population is increasingly urban.	Securing reliable electricity and clean cooking access for women and men living in slums and peri-urban areas enables livelihoods, as well as the legitimacy and economic contribution of urban settlements.
Humanitarian settings More people are living in humanitarian aid settings.	With the growing crisis of displaced persons, humanitarian agencies can deliver improved service to residents by shifting away from reliance on expensive diesel-generated power toward renewable-powered electricity and by providing clean cooking solutions to pre-empt the need for residents to collect firewood.

[2] *The Oxford Dictionary definition of trend is "A general direction in which something is developing or changing." https://en.oxforddictionaries.com/definition/trend.*

This report explores the gendered aspects of the following trends from a global perspective and in the context of five countries—Nigeria and Tanzania in Africa, Bangladesh and Myanmar in Asia, and Haiti in the Caribbean. Criteria used for the selection of trends and country case studies can be found in Annex 1.

POLICYMAKERS SHOULD PAY ATTENTION TO THESE TRENDS

Policymakers should pay attention to the gender implications of these global trends in order to ensure that policy and planning stay on track. These changes in the global and national context could significantly alter the pathway toward achievement of energy access for all and the Sustainable Development Goals by 2030. Employing a gender lens helps identify populations that are most in need of targeted support to meet these goals. Analyzing each of these trends in the national context may help policymakers propel energy access strategies from the perspective of how they would be best designed and deployed to reach both men and women. These trends pinpoint risks that might throw off policy and planning, as well as options for accelerating opportunities and leapfrogging ahead of existing timelines.

THIS SCOPING REPORT

This report explores the role that select global trends play in achieving gender equality in energy access. These trends could influence decisions on how energy is delivered and financed and the contributions of and impacts on women and men. While evidence abounds on the ways in which energy access drives economic growth, alleviates poverty, and delivers other socio-economic benefits, less is known about how trends are impacting gendered energy access. An improved understanding of the gender aspects of these trends aims to support policymakers in shaping policy and finance decisions to enhance the delivery of the 2030 goals and ensure no one is left behind. While policymakers are the primary audience, the research carried out for this report is of interest to diverse stakeholders, including the private sector, multilateral and donor agencies, civil society and grassroots organizations, and research institutions.

RESEARCH DESIGN

Due to the broad landscape of these diverse topics, the research was designed as a scoping study capturing key evidence on each of the trends and countries. The research design consisted of: 1) a desk review spanning regions and sub-regions with energy access gaps for electricity and clean cooking, including Africa, Asia and the Pacific, and Latin America and the Caribbean; 2) individual consultations with representatives of key institutions from developed and developing countries engaged in research in this area; and 3) input and peer review from a Steering Committee to guide the research. The research was also designed to inform strategic interventions to be carried forward by Sustainable Energy for All, particularly the People-Centered Accelerator, and ENERGIA International Network on Gender and Sustainable Energy.

KEY CONCEPTS

The conceptual underpinnings of the research and this report draw on the complementary mandates of Sustainable Energy for All and ENERGIA. The report demonstrates that there are parallel avenues to achieving energy access for all, including the importance of electricity access through centralized and decentralized sources, the growing share of renewable energy and off-grid options, and the crisis of delivering clean cooking solutions. The report focuses on gender equality, with the understanding that women's empowerment is the core avenue for stemming widespread inequality and discrimination against women and girls.

DATA AND SCOPE LIMITATIONS

One of the primary challenges in undertaking a study like this is the limited evidence base available at the intersection of energy access and gender. Globally, sex-disaggregated and gender-relevant data and evidence is very limited, including on access to and use of energy, decision making, household division of labor, productive uses of energy, and entrepreneurship (SEforALL 2017). Another challenge is the limits of a scoping exercise. While policy needs are referenced throughout the report, the scoping nature of the research did not warrant country-specific policy recommendations. The report is intended as a first step in exploring the gender and social inclusion implications of these global trends, with the expectation that the ideas presented here will inspire future phases of more in-depth analysis and policy guidance.

REPORT OUTLINE

Following the present overview on why these global trends matter and the research approach, Section 2 explores each of the six global trends, Section 3 presents suggestions of actionable steps, and Section 4 looks at how these trends play out in the context of the five countries.

CALL TO ACTION

Through this report, SEforALL and ENERGIA seek to inspire policymakers and others to ensure that both women's and men's needs and contributions are addressed in the expansion of energy access. But this scoping study is only a preliminary step. To leave no one behind—and specifically no woman behind—we invite our partners to join us in pursuing further research and data collection on these trends within specific countries, and to share best practices for achieving the parallel goals of energy access and gender equality.

TRENDS, IMPLICATIONS, AND SDGs

Socio-economic trend	Implications for gender equality and social inclusion	Status quo net impact for SDG7	Related SDGs
Decentralization Energy services are increasingly decentralized.	The expansion underway of off-grid and mini-grid energy access solutions presents new opportunities to close gender and social inclusion gaps by reaching those not served by the grid.	SUPPORTS achievement of SDG7	5, 8, 13
Affordability Energy services are increasingly affordable.	With improving technology and increasing scale, energy services are becoming less expensive, and consumer financing packages from DRE companies help to put connections within reach.	SUPPORTS achievement of SDG7	1
Mobile Payments Access to mobile payments is expanding.	Mobile money and other digital innovations can be leveraged to propel women's access to off-grid and clean cooking solutions, as well as their entrepreneurship.	SUPPORTS achievement of SDG7	5
Entrepreneurship Women's business ownership is on the rise in many countries.	The upward trend in women's entrepreneurship is an opportunity to expand energy access by empowering women to help close the access gap at the last mile, reaching those who wouldn't be reached by business-as-usual approaches.	SUPPORTS achievement of SDG7	1, 2, 4, 5, 8, 13
Urbanization The world's population is increasingly urban.	Securing reliable electricity and clean cooking access for women and men living in slums and peri-urban areas enables livelihoods, as well as the legitimacy and economic contribution of urban settlements.	HURDLE to achievement of SDG7	11
Humanitarian Settings A growing number of people live in humanitarian aid settings.	With the growing crisis of displaced persons, humanitarian agencies can deliver improved service to residents by shifting away from reliance on expensive diesel generated power toward renewable-powered electricity and by providing clean cooking solutions to pre-empt the need for residents to collect firewood.	HURDLE to achievement of SDG7	3, 5, 8

II. GLOBAL TRENDS

AND THEIR IMPLICATIONS FOR GENDER EQUALITY AND SOCIAL INCLUSION

Achieving universal energy access will not come to fruition using business-as-usual approaches. The strategies employed by governments and organizations to expand energy access must keep pace with significant change underway in the energy sector, in national economies, and in local communities. Six global trends affecting the modes by which energy is delivered to populations that lack it are presented below, along with implications for gender and social inclusion, and for policy.

TREND 1: DECENTRALIZATION OF ENERGY SERVICES

The expansion underway of off-grid and mini-grid energy access solutions presents new opportunities to close gender and social inclusion gaps.

A. TREND DYNAMICS

Until recently, "poles and wires" were the singular mode of extending access to electricity. Electrification has long depended on power generated centrally, typically by a national utility, then transmitted across long distances across expensive high voltage lines, and distributed to commercial and residential end-users. But this is changing. Off-grid energy service companies, marketing household solar electricity systems that can support varying bundles of LED lights, mobile phone chargers, radios, fans, and/or super-efficient televisions, have emerged as a disruptive force.

Off-grid companies like Off-Grid Electric, Mobisol, and others, have raised substantial equity funding from investors excited about the opportunity to reach the "bottom of the pyramid." Commercially viable mini-grid business models have proven more elusive, but enthusiasm for that prospect remains, as mini-grids can provide a higher, more sophisticated level of electricity, which in turn can support higher, more sophisticated end-uses—including devices that support income-generating activities such as water pumping or grain milling and threshing for agriculture, or cold storage to keep dairy, meat, fish, and other products chilled and free from spoiling for a longer duration.

Decentralized solutions are expected to provide the majority of new access connections by 2030. When energy services are delivered faster, there are significant benefits for individual consumers and society. For households without any access, electric lighting adds additional hours of home study. Higher levels of electricity supply capacity enable broader use of appliances and other equipment for productive activities (SEforALL and Power for All 2017).

The rise of mobile communication technology, which leapfrogged telephone lines in its day, is now helping propel the reach of decentralized energy systems as mobile banking and mobile payments unlock new business models. About 53 percent of the global unelectrified population is already covered by mobile networks (Nique and Smertnik 2015), driving demand for accessible, affordable power-charging facilities—such as those supported by DRE systems.

B. IMPLICATIONS FOR GENDER AND SOCIAL INCLUSION

Decentralized systems increase the possibility of reaching remote populations (Practical Action 2017). Securing energy for all by 2030—universal inclusion—will require off-grid solar PV or mini-grid connections for an estimated 72 percent of those gaining new access (IEA 2017a).

Growing evidence suggests that decentralized systems can drive women's use of energy for income-generating purposes and, therefore, economic empowerment.

Decentralized technologies extend the benefits of modern energy services—including reduced drudgery, time savings, and health and safety—to women and families who live beyond the reach of the central grid. Examples abound of decentralized technologies impacting women's health and well-being in remote areas.

- Electrifying clinics for lighting and medicine refrigeration has been found to improve maternal health in Africa (World Bank 2017a).

- In Indonesia and India, there is evidence linking television exposure to reduced family size, less domestic violence, and increased autonomy for women, due to new norms presented in the media (Grimm et al 2015; Jensen and Oster 2009).

- The presence of public lighting delivered by stand-alone mini-grid systems has critical benefits for the safety of women and girls (World Bank 2017a).

Tapping into women's income-generating opportunities made possible by decentralized power systems (where the alternative would be no power at all) could be a win-win both for access to energy, as women can be engaged as sales agents for clean cooking solutions and off-grid service connections, and for gender equality, as women gain economic empowerment.

Employment and entrepreneurship in decentralized energy could become a major source of income generation for women, especially at the base of the energy ladder but also farther up the value chain. The number of jobs in solar, bioenergy, hydropower, and wind are growing rapidly. IRENA estimates that the

BOX 1: PAIRING OFF-GRID ELECTRICITY ACCESS WITH WOMEN'S LAND TENURE

Land and property tenure is a core component of women's empowerment, as proof of ownership is often needed as collateral for starting a business or setting up a bank, electricity, or mobile phone account. In an experiment in Nepal, demand for decentralized renewable energy was used as a catalyst to expand women's land tenure. To address the high cost of solar-powered irrigation pumps, women who owned or jointly owned land were offered a grant-loan scheme at 10 percent discount. As a result, women made up 77 percent of applicants and, in 82 percent of cases; households transferred land to women in order to take advantage of the scheme (Mukherji et al 2017). In this example, pairing the expansion of renewable energy with women's empowerment goals—such as land tenure—expanded both women's access to energy for productive purposes as well as their legal standing.

BOX 2: WOMEN'S DECISION-MAKING POWER AS AN ENERGY ACCESS CHALLENGE

One of the broader challenges in expanding energy access is gender equality in decision-making. In the Kutui and Homa Bay counties of rural Kenya, solar energy projects offer reliable and affordable electricity in an area where the grid provides poor quality voltage and infrastructure is not well maintained. Some of these solar projects differ from grids and mini-grids in deliberately including women and engaging local people as staff. Efforts are made to train women to install solar systems, which changed social perceptions about women's roles and led to increased applications from women for solar jobs. However, when electricity is supplied through fixed connections to/in the house, women were found to have less control over decision making about appliances and lighting—regardless of whether electricity came from a solar home system, the grid, or a mini-grid—because men paid subscription fees and registered as the customer (Winther et al. 2018). For portable systems with lower subscription fees, but offering a more limited scope for electricity use, women had stronger decision-making power. Achieving universal energy access necessitates understanding and addressing these dynamics of household decision-making.

off-grid sector could create 4.5 million jobs by 2030, particularly in solar PV, and additional indirect jobs will emerge through entrepreneurship. Among existing jobs, 62 percent of existing jobs are located in Asia, with China as the global leader, and India and Bangladesh following behind in that region. Africa currently has about 62,000 renewable energy jobs, three-quarters of which are in South Africa and Northern Africa. According to IRENA estimates, by 2030 the number of global renewable energy jobs (direct and indirect) could reach 15 to 24 million.

C. POLICY IMPLICATIONS

Government decision making on energy rarely reflects gendered realities, partly because ministries do not collect adequate data on household and income-generating energy usage and needs. Greater policy coherence between gender policy and renewable energy planning, as well as gender-disaggregated data collection, would help ensure that decentralized energy services are expanded in a manner that delivers specific benefits to women.

TREND 2: AFFORDABILITY OF ENERGY SERVICES

With improving technology and increasing scale, decentralized renewable energy services are becoming less expensive and consumer financing packages from DRE companies help to put connections within reach.

A. TREND DYNAMICS

Electricity

The least-cost solution for providing energy access to three-quarters of those in Sub-Saharan Africa is through decentralized options, particularly solar off-grid and mini-grid systems (Glemarec et al 2016). Affordability of decentralized options is a key determinant in electrification at the last mile. For those without access to the grid, spending on lighting and mobile phone charging with kerosene, candles, battery flashlights, and similar technologies amounts to US $27 billion per year (Lighting Global and GOGLA 2016). Meanwhile, the cost of appliances has an impact on women's economic empowerment and agency. Off-grid energy service companies frequently bundle solar-powered home electricity systems with highly efficient appliances to maximize the utility customers get from their power, and also to provide consumer financing via monthly installments for the whole package.

Cooking

The upfront cost of improved cooking appliances, as well as alternative fuels such as liquefied petroleum gas (LPG), has been a major barrier in the achievement of clean cooking solutions. Clean cooking technologies are not expensive enough to be a cost-effective offering of microfinance institutions or banks. The Global Alliance for Clean Cookstoves has mapped some of the innovative financing mechanisms used in lighting that assist consumers with up-front capital costs. The Alliance has also worked to overcome the cost barrier by tailoring product development to women's preferences, thus building a higher demand for clean cookstoves (GACC 2015a).

B. IMPLICATIONS FOR GENDER AND SOCIAL INCLUSION

Solar home systems have demonstrated benefits to women through savings on kerosene, better quality light, enhanced child welfare, and increased self-respect and empowerment (Winther et al 2017), but the upfront costs remain a barrier.

This becomes a question of social inclusion, because the upfront costs exclude populations without the financial means to invest in solar home systems. For remote communities, mini-grid and off-grid systems are often a more cost-effective avenue than grid extension because, in the absence of substantial public subsidies, the connection cost is prohibitively high. It is more expensive to provide access to rural areas than urban areas due to the need for lengthy transmission infrastructure and technical losses along the way, plus rural populations usually have less disposable income than those in urban areas.

For poor energy consumers, affordability is determined by whether there are consumer finance options available, such as pay-as-you-go or lease-to-own. These options, typically financed by the energy service company, spread out repayment of the upfront capital cost over time (SEforALL and Power for All 2017). For many poor women, however, access to consumer finance is constrained by the additional hurdle of being outside the formal financial system, lack of access to mobile payments, and not having control over household decision-making (Demirguc-Kunt et al 2014).

Affordability is one of the drivers of the expansion of pico solar (defined as up to 15 watts), which accounted for 94 percent of all off-grid solar sales in 2016, mostly in South

Asia and Sub-Saharan Africa. The overall cost of pico-solar units has decreased significantly in recent years, resulting in 59% of all pico-solar units in Sub-Saharan Africa priced below USD $20 (Nygard et al 2016). Consisting of a solar panel and battery supplying LED lamps and a mobile phone charging port, pico solar only provides a basic level of energy services, but is beneficial to those without access as it displaces kerosene, which produces harmful smoke; enables financial savings once the investment cost has been recouped by what daily outlays to purchase kerosene would have been; and provides a higher quality of light that enhances study time (SEforALL and Power for All 2017).

The purchase of a pico solar product for lighting and phone charging saves a household an average of USD $200 over the life of the product, since it displaces ongoing expenditures on kerosene and phone charging. To date, in aggregate, that has amounted to USD $4 billion in savings in energy-related spending worldwide (Lighting Global and GOGLA 2016).

C. POLICY IMPLICATIONS

Policymakers should assess what women and men can afford in specific contexts and address cost barriers, taking advantage of dramatic reductions in technology costs and the integration of technologies and new business models. Targeted cell phone surveys and other "lean data" approaches enable vastly better data collection than was previously possible (Acumen 2017).

Achieving universal energy access will require policies that address not just the energy sector but also banking, financial, and infrastructure policies that lower the cost of grid and off-grid electricity and clean cooking solutions (Pachauri et al 2013). Improving women's technology choices could be enhanced through access to credit and the collection of data that monitor how they use energy (ENERGIA 2015).

TREND 3: ACCESS TO MOBILE PAYMENTS

Mobile money and other digital innovations could be leveraged to propel women's access to off-grid and clean cooking solutions, as well as entrepreneurship.

A. TREND DYNAMICS

Digitalization is the restructuring of the economy and society around digital communication and media infrastructures (Brennen and Kreiss 2014). Energy is one sector where the digital and physical worlds are converging, moving toward systems that can pinpoint who needs energy and how best to deliver it. Appliances, buildings, vehicles and transportation systems, and industry value chains are becoming smarter and there is greater connectivity between people and between devices, for example through the Internet and mobile phones (IEA 2017c).

The emerging Internet of Things—the network of devices embedded with the ability to connect and exchange data—is improving efficiency and extending technologies and services to new spheres. For example, cloud-based metering and software platforms can be paired with mini-grids and telecom towers, which require electricity. Together these digital solutions can serve as anchor loads to provide the consistent demand that mini-grids need to operate, and can support further investment in expanding electricity supply to remote communities.

There is emerging evidence that digital connectivity may play a leapfrogging effect in relation to poverty reduction. Between 2008 and 2014, Kenya's mobile payments system lifted 200,000 families out of poverty, equal to about 2 percent of the country's households. The impact of access to mobile payments was more pronounced for women, whose access to mobile money prompted a switch to business or retail occupations over farming (Suri and Jack 2016).

Similarly, African economies connected to high-speed (undersea) Internet cables saw a significant increase in employment in connected areas. Increases were seen in startups and cottage industries in slums, although there was a more marginal increase in the employment of less-educated individuals (Hjort and Poulsen 2017). Despite these gains, digital connectivity is not a panacea, as access to mobile and Internet technologies is irrelevant if electricity is not available. Women, in particular, may remain excluded from these poverty-reduction and entrepreneurship benefits, unless the significant gender divide in access to digital and energy technologies and services is addressed.

B. IMPLICATIONS FOR GENDER AND SOCIAL INCLUSION

Women in developing countries have significantly lower rates of digital literacy than men. A study by Intel found that 25 percent fewer women than men across developing countries had Internet access, largely due to the high cost of a connection (Intel 2013). Social norms are also at play in many communities, as the use of mobile phones is sometimes deemed inappropriate for women and girls.

The digital revolution, alongside international investment, is propelling new modes of financing solar home systems, especially in geographic areas that are too difficult or costly for the grid to reach. When mini-grid and off-grid electricity providers have access to the Internet and communications, this can accelerate expansion of energy access, especially as a tool for cashless payments that reduce the cost of many small-scale transactions and improve customers' repayment rates (UN Chronicle 2015).

New digital approaches are also being used to improve adoption of clean cookstoves, such as in India, where women are paid through a system of climate credits to use stoves and fix them when they break (Ramanathan et al 2017).

New digital technology that manages grid inputs and outputs allows off-grid consumers to play a more active role in electricity production. The declining costs of solar PV and batteries means that greater amounts of energy

can be stored "behind" the household electricity meter (IEA 2017c), which is an opening for women as household energy managers to assume more control.

Access to mobile technology by women and those in remote locations is a key determinant in the expansion of new financial models. While global access to mobile phones is increasing, a substantial gender gap remains in low-income and middle-income countries. Women in these countries are 10 percent less likely than men to own a mobile phone, or 184 million fewer women than men, due to women's lower levels of education and income (GSMA 2018).

Mobile finance can help women access energy products and services, as well as support services for agriculture. For women entrepreneurs in developing economies, digital commerce and other technologies can overcome limited access to finance, time constraints, mobility, and skills and training (UNCTAD 2017). Access to mobile finance also enables women to invest in businesses and pay for their families' education and health needs (Lewis et a 2016).

C. POLICY IMPLICATIONS

Expanding women's access to mobile finance has the potential to expand local markets and reach more of those without access to electricity and clean cooking solutions (IEA 2017a). First and foremost, mobile money has to be expanded, especially in less-developed countries where a lack of these services persists. Attention should be focused on the gender digital divide when making decisions about how to expand mobile money, for example considering the needs of female-headed households.

Global technology companies moving to connect rural areas in developing countries to their services should consider women's and men's needs, including energy needs that could benefit from solar home systems and mini-grids, as well as the application of Pay-As-You-Go models to finance irrigation pumps, LPG canisters, and biogas systems (GSMA 2017).


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TREND 4: ENTREPRENEURSHIP

The upward trend in women's entrepreneurship is an opportunity to expand energy access by empowering women to close the access gap at the last mile, reaching those who wouldn't be reached by business-as-usual approaches.

A. TREND DYNAMICS

Globally, the number of women engaged in entrepreneurial activities is growing steadily, although some regions are not seeing this increase. The 2018 Mastercard Index of Women Entrepreneurs concludes that, while there is much room for improvement, women's advancement as entrepreneurs is "adequately healthy" in the majority of regions. While Ghana and Uganda have high proportions of women business owners, Sub-Saharan Africa and the Middle East are lagging behind other regions (Mastercard 2018). Similarly, the 2014 Gender Global Entrepreneurship and Development Index finds a high level of "female entrepreneurial drive" in certain African countries—Ghana, Nigeria, South Africa, and Uganda—but, as a whole, Sub-Saharan Africa has fewer female entrepreneurs (GEDI Institute 2014). In developing countries, women's business leadership is more prevalent in smaller firms, just under 40 percent of small companies, compared to half that for medium-size companies (IFC 2011).

Table 2 shows the broad range of female business ownership levels in select Sub-Saharan African and Asian countries.

TABLE 2: WOMEN BUSINESS OWNERS (AS % OF TOTAL BUSINESS OWNERS) 2018

Africa		Asia	
Ghana	42.4%	Vietnam	31.3%
Uganda	33.8%	Bangladesh	25.9%
Botswana	24.5%	Philippines	23.9%
South Africa	18.8%	China	23.1%
Nigeria	17.8%	Malaysia	16.7%
Ethiopia	9.5%	Indonesia	15.8%
Malawi	8.0%	India	11.0%

Source: Mastercard Index of Women Entrepreneurs 2018

BOX 3: LPG MARKET CONSIDERATIONS

While a fossil fuel with environmental drawbacks and not without safety hazards, LPG is a step forward from biomass cooking for health and climate change outcomes (Rosenthal et al 2018). In urban areas, LPG use has been increasing and its expansion in developing Asia is expected to make up the majority of global expansion through 2030, despite the 2.3 billion people worldwide projected to remain without access (IEA 2017a). In rural areas, poor infrastructure and infrequent delivery of LPG cylinders are part of the equation of low supply and, on the demand side, the prohibitive cost and distribution challenges are compounded by limited awareness at the household level of the benefits of alternative fuels (ENERGIA 2014).

The increase in the rate of women's entrepreneurship parallels a surge in international dialogue and investment in women's economic potential. This is signaled by the establishment of the High-Level Panel on Women's Economic Empowerment by the UN Secretary-General in 2016 (UNHLP 2016), new global investment mechanisms such as Calvert Foundation's Women Investing in Women Initiative and Goldman Sachs' 10,000 Women initiative, and numerous leadership and award programs to catalyze women's leadership in business, science, technology, engineering, and mathematics (Stengel 2016). This new wave of support for investing in women draws on analyses correlating gender equality with global economic growth (Mastercard 2017; GEM 2017).

B. IMPLICATIONS FOR GENDER AND SOCIAL INCLUSION

The expansion of sustainable energy, especially to remote areas, may depend on women's engagement as entrepreneurs, due to the unique relationship they have with female energy consumers.

Women's household decisions about energy afford them a nuanced understanding of their customer base and supply chain, which can translate into a minimal business cost in identifying and securing customers. Supporting women's businesses may bring greater return on investment, as studies confirm women are a lower credit risk and repay loans more frequently than men (Zelizer 2011). Women's business success also translates into reinvestment in families and communities, as women entrepreneurs are more likely to spend earnings on children's education and health, compared to male entrepreneurs (Pazarbasioglu 2017).

Women entrepreneurs have been found to demonstrate an advantage in managing supply chains and reaching customers in rural areas (Glemarec 2016; Gray et al 2016) and there are examples of women outperforming men in selling energy products, including solar lanterns and cookstoves. In these studies, women's success is attributed to their ability to influence members of their community, the broad networks within which they have relationships, and their understanding of women's particular energy needs (Soria et al 2016; GACC 2015b).

Women have great need for energy to process and prepare food, which they often sell informally for small amounts of income. Women engaged in this kind of work benefit when they have access to support the different dimensions of their activities—for cooking the food, re-heating it to serve or cooling it to store, lighting a kitchen or a vendor stall, mechanical power to assist with the preparation, and transportation between point of production and point of sale.

C. POLICY IMPLICATIONS

To propel energy access, policymakers need to create a business and regulatory environment that supports women-owned small and medium enterprises, as well as other aspects of their well-being. While financing targeted to the needs of women-led businesses is key, a rich evidence base shows that support beyond financing is critical to women's economic empowerment.

Support to women-led startups that combines finance and business training is more effective than either finance or business training alone (Patel 2014). Tackling broader gender barriers—for example, addressing improvements in health and education, gender-based violence, child care, land and property rights, and rural electrification—are equally important (Buvinic and O'Donnell 2016).

In an effort to train women as energy entrepreneurs in Bangladesh, Grameen Shakti learned some key lessons. They found that women were unlikely to develop into independent entrepreneurs in the absence of broader skills development, support entering established renewable energy supply chains, and changes in social norms that designated the installation of solar home systems as a male domain (Glemarec et al 2016). Another study considering OECD policy recommendations to

support women entrepreneurs found that India was missing key policies on affordable child care, closing the gender gap in education, and other support that would help women initiate small and medium enterprises (Fazalbhoy and Menon 2015).

Initiatives driven by the potential of women sustainable energy entrepreneurs are an important testing ground for the factors that best support them.

- In Nepal, Kenya, and Indonesia, the ENERGIA International Network on Gender and Sustainable Energy provides a comprehensive package of support including step-by-step capacity building on technology, business and marketing skills, and leadership; finance facilitation through loan guarantee funds, microcredit, local cooperatives, and self-help groups; and facilitation of distribution chains to bring energy products to remote locations (ENERGIA).

- Solar Sister builds on women's social networks in Uganda, Nigeria, and Tanzania to extend energy access to hard-to-reach communities and works to decrease the risks and costs of women starting their businesses (ICRW 2015).

- In India, Frontier Markets emphasizes the importance of up-front assessments of consumer needs and quick and simple servicing to build trust in products (Frontier Markets).

- In multiple countries, Barefoot College emphasizes demystifying technology with illiterate and semi-literate women who are trained to build, install, maintain, and repair solar electrification systems (Barefoot College).

Further research is warranted on the extent to which women energy entrepreneurs could expand energy access.

Employment and entrepreneurship in decentralized energy could become a major source of income generation for women, especially at the base of the energy ladder but also farther up the value chain (Pearl-Martinez and Stephens 2016; Glemarec et al 2016). The number of jobs in solar, bioenergy, hydropower, and wind are growing rapidly. IRENA projects that the number of global renewable energy jobs (direct and indirect) could reach 15 to 24 million by 2030 (IRENA 2017a). The off-grid sector could create 4.5 million jobs by 2030, particularly in solar PV, and additional indirect jobs will emerge through entrepreneurship (IRENA 2013). As for existing jobs in renewable energy, 62 percent are located in Asia, with China as the global leader, and India and Bangladesh following behind in that region. Africa currently has about 62,000 renewable energy jobs, three-quarters of which are in South Africa and Northern Africa (IRENA 2017b).

BOX 4: BARRIERS TO WOMEN'S ENTREPRENEURSHIP

Women face more bottlenecks to building businesses than men. Existing evidence catalogues the significant and wide-ranging barriers restricting women's business ownership, including lack of access to capital, regulatory restrictions, isolation from business networks and intermediaries, lack of access to market data and information, discriminatory cultural and gender norms, lower levels of education and business experience, limited female role models and mentors, and competing demands of household and family responsibilities without access to child care (GEM 2017).

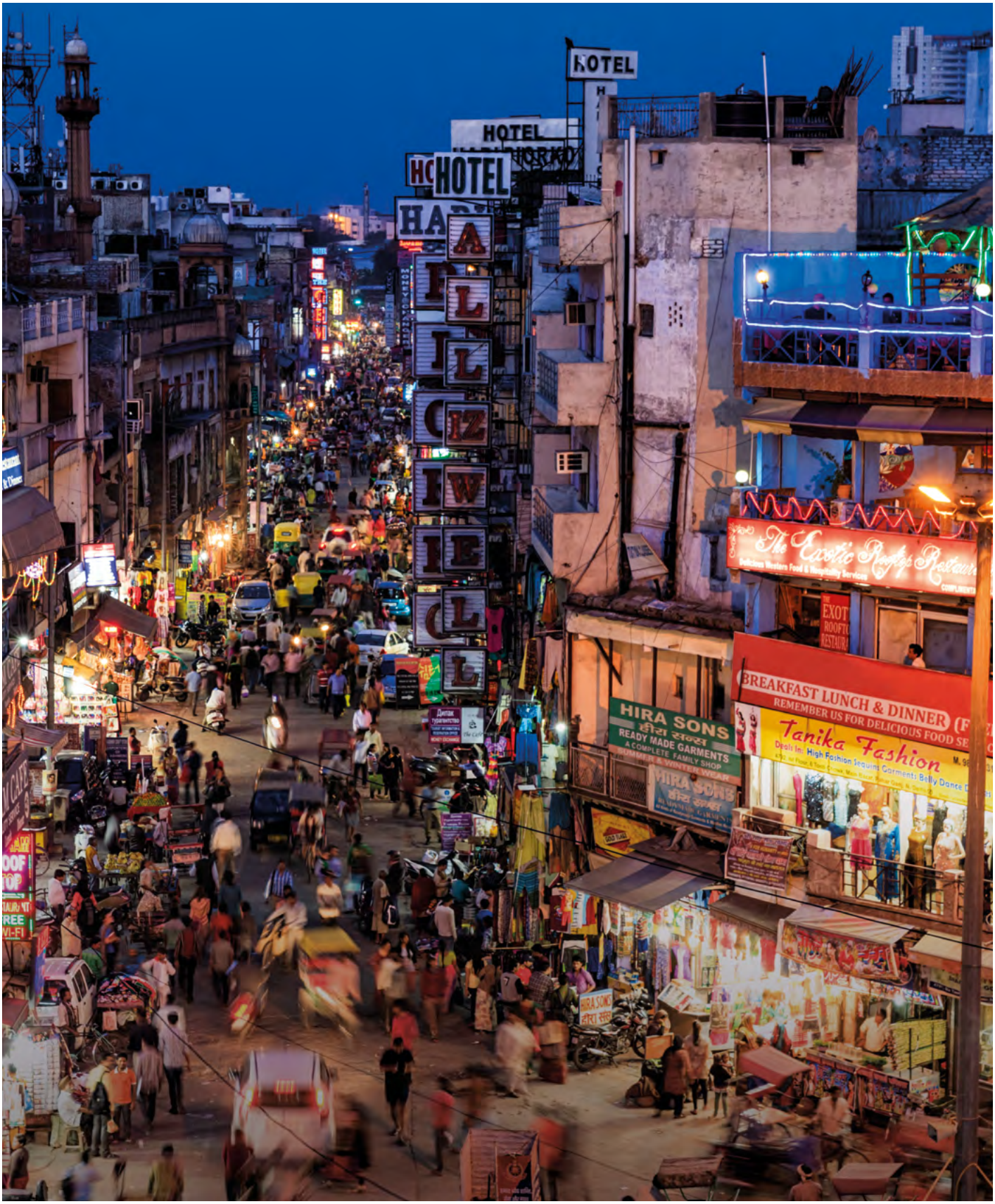
In developing countries, 70 percent of women with small and medium-size businesses are not accessing financing, amounting to nearly USD $300 billion per year (World Bank 2017b). In attempts to access capital, women entrepreneurs face higher interest rates, are required to demonstrate collateral for a higher proportion of a loan, and are assigned shorter loan periods.

New methods are emerging to deliver financing to women who cannot provide collateral; for example, psychometric computer-based testing—that predicts the ability of a borrower to repay a loan—is on the rise in emerging markets (Kynge and Schipani 2015). A World Bank initiative in Ethiopia offering loans to women entrepreneurs who score high on the test is seeing loan repayment rates of over 99 percent (Strobbe 2015).

A country's entrepreneurial conditions are a predictor of the number of women-owned businesses. Factors promoting women's entrepreneurship include support for small and medium enterprises, ease of doing business, cultural perceptions of women entrepreneurs, and quality of governance (Mastercard 2017). Given that legal and regulatory structures protect women's business activities as well as men's, countries with stronger rule of law and greater women's political empowerment also have higher rates of women's entrepreneurial activity (Goltz et al 2015).

Most countries have at least one law undermining women's economic opportunities, especially related to the informal economy where most women in developing countries work. Gender inequality in legal frameworks reduces the number of women in the workforce and widens the gender gap in income (UNHLP 2017).

Compared to their male counterparts, female entrepreneurs aren't on a level playing field. They face gendered information gaps, discriminatory norms, disproportionate responsibility for domestic work and unpaid care, lower access to recourse, and lower levels of collateral, reducing a woman's creditworthiness. Women entrepreneurs are, however, more likely to have better knowledge about the creditworthiness of their customers and will benefit from policy instruments that support lending capacity to female customers.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HOTEL
HOTEL
The Exotic Rooftop Restaurant
BREAKFAST LUNCH & DINNER
REMEMBER US FOR DELICIOUS FOOD
Tanika Fashion
HIRA SONS
READY MADE GARMENTS
A COMPLETE FAMILY SHOP

TREND 5: URBANIZATION

Securing reliable electricity and clean cooking access for women and men living in slums and peri-urban areas would improve their livelihoods, as well as the legitimacy and economic contribution of urban settlements.

A. TREND DYNAMICS

Slum dwellers make up about one-third of the world's urban population and by 2030 about 60 percent of the global population will live in cities, according to UN statistics. Energy services are not keeping up with the growing demand of this expanding population. In the fastest growing cities, electricity generation may not be keeping pace with demand, leading to voltage fluctuations, brownouts and blackouts, and unreliable service.

Electricity to support productive use and economic development is often prioritized—but focused on large-scale commercial and industrial needs, not on smaller enterprises of the urban poor. The result is that the urban poor are forced to rely on polluting fuels for cooking, to the detriment of city air quality, or to install diesel generators to have access to reliable (although dirty and expensive) electricity.

In urban areas, grid connections are expected to be the most cost-effective means of expanding electricity access by 2030. However, shifting to clean cooking fuels, such as liquefied petroleum gas (LPG), is also central to expanding energy access and would lead to the most dramatic reduction in both indoor and outdoor air pollution (Westphal et al 2017).

In urban areas, LPG is projected to provide access to 90 percent of those gaining access to clean cooking by 2030. Due to population growth, the number of people without access to clean cooking today—2.8 billion—has remained relatively unchanged since 2000. While there are success stories in urban areas of China and Indonesia of fuel switching from traditional biomass to LPG, at a global scale, 2.3 billion people are projected to remain without access to clean cooking by 2030 (IEA 2017a).

B. IMPLICATIONS FOR GENDER AND SOCIAL INCLUSION

Urban environments facilitate more immediate proximity to energy supplies and contribute to economic empowerment, yet the marginalized women and men living in informal urban settlements have a harder time accessing energy.

About half of those living in slums depend on unpaid connections to electricity, leaving utilities without revenue (Danielsen 2012). While there is evidence of insecure property tenure leaving female-headed households without energy access, there is a general lack of knowledge about the gender aspects of urban energy poverty (Heinrich Boll Stiftung 2016). The realities of poor urban households are often missing in national energy policy. Informal settlements in cities may not be recognized by authorities, and fall in the gap between national energy ministries, urban energy companies, and rural electrification agencies (Danielsen 2012).

A study from South Africa illuminates the challenges of securing energy access for women living in urban informal settlements, who make up one-third of the country's female population. The study found that for those residing in the backyards of more formalized housing, the cost of electricity is extremely high, pushing them to resort to paraffin candles or kerosene, which are also expensive per unit of light (lumens) produced. And those without a formal connection resort to illegal means of connection or also use expensive and unsafe fuels. Also, households relying on informal connections can be charged higher prices by illegal intermediaries.

In townships that don't have street lighting, gender-based crime is a major problem, particularly because

sanitation facilities are located at a distance from households. Electrification efforts are obstructed by the lack of coordination between housing and energy initiatives, and public subsidies are not sufficient to make energy access adequately affordable.

C. POLICY IMPLICATIONS

Policymakers need to circumvent tenure and payment barriers for women and men living in slums and peri-urban areas. Municipalities, national energy ministries, and other agencies responsible for energy supply should be sensitized to the needs of women in informal settlements, collect data on those populations, and address the unique barriers faced by women and men in securing access to energy in these environments.

Given the reliance of poor households on cooking fuels that cause indoor (and outdoor) air pollution, solutions should include clean cooking technologies and fuels, in addition to electricity and solar home systems. Subsidized tariffs must be designed to ensure true affordability for those most in need, particularly female-headed households. Alternative payment arrangements to alleviate upfront costs can include monthly installments and prepaid connections. To facilitate legal connections to electricity and LPG for those without proof of land or property ownership, agencies should accept alternative forms of proof of address.

Some experiments have found success in reaching these populations.

- In India, a Delhi energy company has leveraged the tight-knit social fabric of the city's slums by hiring over 800 women residents to persuade their neighbors to pay power bills via partial payments, when necessary, in return for greater reliability of the system for the entire community. This has resulted in a 40 percent increase in active power connections (Shrivastava 2017). This model is being replicated now in Kenya and Jamaica.

- In Mumbai, India, the government guaranteed 18 months of tenure for slum households, and an NGO guaranteed collection of electricity payments, in order to motivate the electricity supply company to install electricity infrastructure, resulting in legal electric connections for most households, reduced electricity theft, and increased productive use of electricity (Putti 2011).

- In Thailand, government-issued temporary household registrations allow owners to apply for electricity connections and grocery shops are exempt from complex applications to distribute LPG, which led to increased access by the urban poor.

- In Argentina, prepaid meters allow the urban poor to choose the number of electricity units they need and spread out payments over time (Singh et al 2014).

TREND 6: HUMANITARIAN SETTINGS

With the growing crisis of displaced persons, humanitarian agencies must prioritize the provision of clean cooking solutions and renewable-powered electricity.

A. TREND DYNAMICS

The number of people who are forcibly displaced has nearly doubled in the past two decades—up to 65.6 million people as of 2016, half of which are women (UNHCR. 2016). Of these, 8.7 million people live in refugee camps with minimal access to electricity, relying on collected fuelwood for cooking (Lahn and Grafham 2015).

The vast majority of refugees are hosted by developing countries, where governments often have less surplus capacity to provide additional energy services (Morales 2017). While many displaced are housed in camps hosted by countries other than their own, many more are internally displaced and similarly lack modern energy provisions. And it's not just the result of armed conflict. Humanitarian emergencies from natural disasters—such as the 2010 Haiti earthquake—have increased the numbers of internally displaced persons without modern energy access.

Humanitarian relief settlements can range in size from large towns to small cities and the residents—while, in theory, there only temporarily—require energy for household cooking and lighting and community services such as power to operate schools and health centers, refrigerate medication, pump water, and support administration staff functions.

Electricity is typically delivered through diesel generators, at great operational cost due to the expense of fuel deliveries. DRE alternatives (discussed in Trend 1) such as solar-powered mini-grids with diesel or batteries for backup, are recognized as options by these agencies, but are not yet the go-to solution.

This is driven by a shortage of energy expertise within humanitarian agencies, along with a lack of a systematic long-term energy planning and management. While financing is needed for energy supply solutions that span both emergency and recovery periods, humanitarian funding is often short-term and politically-oriented, in quick response to emergencies that soon fall off the radar (Lahn and Grafham 2015). In addition, a challenge for humanitarian agencies is that installing more durable energy supply infrastructure in humanitarian settings can signal the potential permanence of these settlements to wary host governments (Morales 2017).

Governments also grapple with tensions between refugees and host communities caused by competition for fuelwood, as almost 65,000 acres of forest are burned for fuel each year by people living in refugee camps (Lahn and Grafham 2015).

B. IMPLICATIONS FOR GENDER AND SOCIAL INCLUSION

SAFETY. Access to non-traditional energy sources, particularly in humanitarian settings, is a matter of protecting women's and girls' lives. Firewood collection for household energy is often a dangerous task. Reports abound from Chad to Sudan of women experiencing physical aggression, theft of property, or rape during trips outside camps to collect firewood. Women are discouraged from reporting sexual assaults due to cultural expectations or because firewood collection outside camps is illegal in many countries (Lahn and Grafham 2015). This is compounded by the insecure legal status of people living in camps (Morales 2017).

SECURITY. Electricity for street lighting can keep shops and public spaces open later and generally improve the lives of those in humanitarian settings, especially women. In one example from the Goudoubo refugee camp in Burkina Faso, only 3 percent of those who leave the

house after dark are women, due to the lack of public lighting (Vianello 2016).

HEALTH. The health impact of cooking with traditional fuels is substantial, especially for women and girls. Based on the number of displaced people reliant on biomass and the mortality rate of those relying on traditional fuels, an estimated 20,000 forcibly displaced people face premature death from indoor pollution each year (Lahn and Grafham 2015). Not having to collect firewood also facilitates time available for women's economic and educational activities in these camps (UNHCR 2012).

C. POLICY IMPLICATIONS

Facilitating this energy transition for both the acute emergency phase and for longer-term solutions requires a focus on the ways in which displaced people choose, access, and pay for energy services. The viability and cost of sustainable energy solutions are specific to the local humanitarian setting and depend on resource availability, affordability, ease of access, and capacity to maintain technology.

Equitable access to sustainable energy should become a formal—and central—component of humanitarian aid. To start, international policy frameworks, humanitarian organizations, and national governments need to adopt coordinated energy access goals and guidelines for displaced people, ensuring that women's needs are assessed and clearly articulated.

To deliver on these policies there is a need for increased capacity and funding; coordination among government, UN agencies, and NGOs that are offering their own divergent solutions in camps; standardized methods for energy-related data collection in camps that reflect the needs of both women and men; and consideration of granting displaced peoples the right to work and access land, which could provide the means for them to pay for energy services, supporting energy delivery solutions (Lahn and Grafham 2015).

Sustainable technologies and clean fuels should be prioritized in humanitarian settings, and replacing diesel generators with DRE systems can reduce long-term fuel and other operational costs (UNHCR 2012). In settlements of Syrian refugees in Jordan, homes are being refurbished with solar water heaters and solar panels are being installed at a hospital, enhancing energy access while reducing the overall cost to households and donors (Moving Energy Initiative).

Providing cash instead of fuel to vulnerable households allows them to make their own energy choices. Expanding the sustainable energy options available to camp residents may benefit from greater involvement of market mechanisms in energy delivery through coordination and partnership with the private sector (Lahn and Grafham 2015). Delivery models that are most applicable to humanitarian settings include low-cost energy products and micro-grids; financing models include PAYG, leasing products, consumer micro-credit, and centralized charging (Gunning 2014).

Both host communities and displaced populations benefit when sustainable energy services are delivered at lower cost and facilitate an integration of these populations (Morales 2017). Host country officials appreciate the benefit of saving scarce natural resources from fuelwood collection. Ideally, refugees entering a humanitarian camp would receive a suitable cookstove and fuel, a solar lantern, as well as training on any new technology (UNHCR 2012). As an interim step, assessments and stakeholder consultations in camps need to precede the selection of stoves, fuels, and energy technologies that residents receive.

III. CALL TO ACTION

Through this report, SEforALL and ENERGIA seek to inspire policymakers and others to achieve universal energy access by ensuring that both women's and men's needs and contributions are addressed. But this scoping study is only a preliminary step. To leave no one behind—and specifically no woman behind—we invite our partners to join us in pursuing further research and data collection on these trends within specific countries, and to share best practices for achieving the parallel goals of energy access and gender equality.

This call to action aligns with SEforALL's People-Centered Accelerator, which aims to:

- Demonstrate and help scale-up sustainable access pathways for the most vulnerable and hardest-to-reach people.

- Help direct capital to gender-responsive and socially inclusive energy businesses to support faster delivery of sustainable access solutions.

- Empower women engaged in energy service delivery to achieve autonomy, authority, and decision-making power at work and thereby accelerate progress on international climate change and sustainable energy goals.

Energy access solutions must not be designed in a vacuum; instead, the realities of gender inequality and social exclusion should be used as a guidepost. In the context of a rapidly changing world, paying attention to these inequalities is more important than ever and presents extraordinary opportunities:

DECENTRALIZATION

The expansion underway of off-grid and mini-grid energy access solutions presents new opportunities to close gender and social inclusion gaps by reaching those not served by the grid. Government decision-making on energy rarely reflects gendered realities, partly because ministries do not collect adequate data on household and income-generating energy usage and needs. Greater policy coherence between gender policy and renewable energy planning, as well as gender-disaggregated data collection, would help ensure that decentralized energy services are expanded in a manner that delivers specific benefits to women.

AFFORDABILITY

With improving technology and increasing scale, energy services are becoming less expensive and consumer financing packages from DRE companies help to put connections within reach. Policymakers should assess what women and men can afford in specific contexts and address cost barriers, taking advantage of dramatic reductions in technology costs and the integration of technologies and new business models. Achieving universal energy access will require policies that address not just the energy sector but also banking, financial, and infrastructure policies that lower the cost of grid and off-grid electricity, and clean cooking solutions.

MOBILE PAYMENTS

Mobile money and other digital innovations can be leveraged to propel women's access to off-grid and clean

cooking solutions, as well as their entrepreneurship. Expanding women's access to mobile finance has the potential to expand local markets and reach more of those without access to electricity and clean cooking solutions (IEA 2017a). First and foremost, mobile money has to be expanded, especially in less-developed countries where a lack of these services persists. Attention should be focused on the gender digital divide when making decisions about how to expand mobile money, for example considering the needs of female-headed households.

ENTREPRENEURSHIP

The upward trend in women's entrepreneurship is an opportunity to expand energy access by empowering women to help close the access gap at the last mile, reaching those who wouldn't be reached by business-as-usual approaches. To propel energy access, policymakers need to create a business and regulatory environment that supports women-owned small and medium enterprises, as well as other aspects of their well-being. While financing targeted to the needs of women-led businesses is key, a rich evidence base shows that support beyond financing is critical to women's economic empowerment.

URBANIZATION

Securing reliable electricity and clean cooking access for women and men living in slums and peri-urban areas enables livelihoods, as well as the legitimacy and economic contribution of urban settlements. Policymakers need to circumvent tenure and payment barriers for women and men living in slums and peri-urban areas. Municipalities, national energy ministries, and other agencies responsible for energy supply should be sensitized to the needs of women in informal settlements, collect data on those populations, and address the unique barriers faced by women and men in securing access to energy in these environments.

HUMANITARIAN SETTINGS

With the growing crisis of displaced persons, humanitarian agencies can deliver improved service to residents by shifting away from reliance on expensive diesel-generated power toward renewable-powered electricity and by providing clean cooking solutions to pre-empt the need for residents to collect firewood. Equitable access to sustainable energy should become a formal—and central—component of humanitarian aid. To start, international policy frameworks, humanitarian organizations, and national governments need to adopt coordinated energy access goals and guidelines for displaced people, ensuring that women's needs are assessed and clearly articulated.

IV. COUNTRY CASE STUDIES

The country case studies below—Nigeria, Tanzania, Bangladesh, Myanmar, and Haiti—offer a snapshot of how the trends are taking shape on the ground. Country-level information and data on these trends are limited and varied, particularly on issues of gender equality and social inclusion. This sample of available studies and data is intended to capture the status quo and pinpoint opportunities and challenges, with the intention of inspiring increased knowledge development and policy attention. While the limited existing information does not warrant a thorough comparative analysis or detailed country-specific recommendations, this introduction points out similarities and differences across the five countries.

As outlined in more detail in the case studies below, what all of these countries have in common is a significant energy access gap. Tanzania has the lowest level of electricity access, followed by Haiti. While more than half of Nigeria's population has an electricity connection, constant outages significantly decrease the reliability of this access. Tanzania and Bangladesh stand out for government efforts that expand off-grid electricity access. And the success seen by Bangladesh in expanding solar home systems has facilitated a shift in focus beyond basic electricity access. Tanzania and Bangladesh face the challenge of maintaining a market that will continue to expand off-grid access (particularly in the context of competition from low-quality and cheaper products), while Myanmar and Haiti struggle to initiate a market for solar technologies and the government has yet to launch measures that would make off-grid technologies more affordable.

In all five countries, 90 percent of the population cooks with biomass. Bangladesh has found success in expanding clean cooking, but struggles to convince some households to adopt clean cookstoves. Myanmar's and Haiti's clean cooking sector is not yet driven by government programs. Access to cleaner fuels, such as LPG, remains widely prohibitive in terms of infrastructure and cost.

In Tanzania and Myanmar, mobile phone uptake has increased rapidly, outpacing electricity access, which signals opportunities for expanding mobile-based payments and access to mobile banking. However, the gender gap in mobile phone ownership and bank accounts remains widespread.

In all countries, slum dwellers and those living in humanitarian settings are without electricity connections or have unreliable or unaffordable connections. Although Myanmar has seen a rapid increase in urban electrification, slums in the capital still rely on biomass. Governments and international agencies have yet to prioritize energy access in humanitarian situations.

Aspects of gender inequality are diverse across these countries. Bangladesh and Tanzania have seen improvements in women's political participation, while Myanmar and Haiti lag far behind. Nigeria, Tanzania, and Myanmar have a higher rate of women's business ownership than most developing countries. But in all five countries, the needs of women's micro-enterprises in the informal sector are not receiving enough government support. Women's participation in the labor force approaches that of men in Tanzania, Myanmar, and Haiti, while Bangladesh lags behind. Even when women's economic participation is thriving, women in these countries continue to struggle with access to credit, financing, and land. In Myanmar and Haiti, significant gaps persist in legal protections for women, and in Myanmar few women or men have access to bank accounts. Women's information access is also a widespread challenge. In Bangladesh for example, some women are not convinced that they should adopt clean cookstoves and women business owners are unaware

of government programs that could make financing available. Across all countries, data and research are scarce at the intersection of energy access, gender equality, and social inclusion.

While four of the countries have policies addressing the gender aspects of energy access, Haiti's national energy plan does not address gender equality. Tanzania stands out on strong gender policies across multiple sectors beyond energy, but as in many countries worldwide, implementation remains to be seen.

LANDSCAPE OF ECONOMY AND ENERGY					
General	**Nigeria**	**Tanzania**	**Bangladesh**	**Myanmar**	**Haiti**
Population	182,201,962	53,470,420	160,995,642	53,897,154	10,711,067
Income Group	Lower middle income	Low income	Low income	Lower middle income	Low income
GNI per capita (US$)	2,820	910	1,190	1,293	820
Energy Access Indicators					
% of pop with electricity access	58	16	62	52	38
% of pop with clean cooking access	2	2	10	9	9
Regulatory indicators for sustainable energy (RISE)					
RISE score overall	21	54	49	38	11
RISE score – energy access	22	75	68	59	13

Source: http://rise.esmap.org/

A. NIGERIA

ENERGY ACCESS IN NIGERIA

58%
of the population has electricity access

2%
of the population has clean cooking access

22/100
score on energy access policy

Nigeria is currently the largest economy in Africa, and predicted to be one of the world's 15 largest economies by 2050 (PWC 2017). However, the country has extreme rates of economic inequality (Oxfam 2016). Over half of Nigeria's population ostensibly has access to electricity but—due to problems with reliability, at a national average of 60 power outages per week—an estimated 80 percent of those with connections also rely on other sources of electricity, mostly diesel generation. Across the continent, Nigeria is the largest importer of diesel generators and households and businesses spend $22 billion annually on diesel fuel (IEA 2017a).

Nigeria is among the 20 countries in Sub-Saharan Africa where over 90 percent of the population cooks with solid biomass; two-thirds of African kerosene users are in Nigeria. Nigeria is also one of the few countries in Sub-Saharan Africa with access to LPG (IEA 2017a); however, the majority of national oil production is exported and the country lags behind other African countries in LPG use due to low demand. The government has a target to replace kerosene for cooking with LPG, but faces inadequate infrastructure for distribution and retail, and has not put in place enough regulatory oversight to attract investment (Oredola 2017).

Nigeria has a modest electrification goal of increasing access to 75 percent of the population by 2020 (Federal Ministry of Power 2015) and has articulated plans to reach 100 percent of the population by 2030 through grid extension and off-grid solar (REN21 2017).

GENDER EQUALITY IN NIGERIA

- In the gender development index, Nigeria scores 0.847 out of 1.00 on gender equality in health, education, and command over economic resources.
- In the African gender equality index, Nigeria scores 54.7 out of 100 on gender equality in economic opportunities, human development, law & institutions.
- In the global gender gap index, Nigeria scores 0.641 out of 1.00 score (122nd out of 144 countries) on economic participation and opportunity, educational attainment, health and survival, political empowerment.

Nigeria has a national gender policy focused on women's empowerment and eliminating discrimination, but traditional customs have been a stumbling block. Gender bias is pervasive within federal and state law, for example in relation to property rights and employment (Egwurube 2016). Progress has been made in primary school education, but women remain disadvantaged in terms of economic empowerment, representation in government, and maternal mortality (OECD 2014). In 2016, the Nigerian Senate voted down legislation to promote gender equality and equal opportunities after six years of consideration, citing the population's religious and cultural beliefs (Ayodeji et al 2017).

Nigeria's national plan on renewable energy and energy efficiency notably proposes equal access to credit for women's micro-enterprises, extension services for women on sustainable energy, collection of gender data, and incorporating gender dimensions in energy and rural development policies (Federal Republic of Nigeria 2015).

HOW THE TRENDS IMPACT ENERGY ACCESS IN NIGERIA	
Decentralized energy	• There is a strong demand for off-grid systems in Nigeria and policy statements prioritize renewable energy, yet specific measures have been missing that would attract private solar investors and the cost of consumer loans has been too high (ODI 2016). • Investment prospects improved somewhat in 2016, with a new mini-grid strategy that improved clarity on the regulatory process (SEforALL 2017a). • The environment ministry has supported an initiative that brings together Nigerian women to create clean energy enterprises and train women in the manufacturing and maintenance of clean cookstoves and solar systems (CCAC 2017).
Affordability	• Since much of the equipment used in energy access projects is imported, such as solar panels and clean cookstoves, the cost of locally made products more than doubled during 2016-2017 (SEforALL 2017a). This makes it more difficult for those with limited financial assets, particularly women, to access new energy technologies.
Mobile Payments	• The pay-as-you-go market has begun to open up in Nigeria and there are plans to build out the telecom sector, yet still only 1 percent of the population uses mobile money. • Whereas mobile telecom companies in Kenya led the acceleration of banking access in rural and remote areas, and thus pay-as-you-go energy access, Nigeria's banking sector has effectively prevented this, having pressed the government to prevent these types of companies from gaining market share, arguing that they should face the same regulations as the financial services sector.
Entrepreneurship	• About 44 percent of the population over 15 years of age and 34 percent of the low-income population have a bank account, which is markedly higher than other countries in West Africa (SEforALL 2017a). • Women own almost half of micro-enterprises and just over one out of every 10 medium-size enterprises (Mastercard 2017). • Women's businesses are mostly run in the informal sector, weakening access to financing and the prospects for growing beyond micro-enterprises (Stevenson et al 2011). • Women entrepreneurs looking for finance to scale their business face high interest rates, collateral requirements complicated by lack of land tenure, and complex loan application procedures—in addition to challenges faced by all entrepreneurs, such as policy inconsistency and poor infrastructure (Stevenson et al 2011). • Women have sole ownership of about 3 percent of the land area owned or accessed by households in Nigeria; men's land plots are on average 2.3 times larger (Doss et al 2015). In many countries, women's extremely limited land ownership translates into a lack of collateral for starting a business. • Nigeria's Bank of Industry is designed to serve small and medium enterprises and has a loan program exclusively for women (Stevenson et al 2011), but collateral and other requirements often prevent firms of this size from securing loans (SEforALL 2017a).
Urbanization	• About 70 percent of the population in Lagos lives in slum settlements and only 15 percent of households are connected to the grid (WRI). • Among poor households in Lagos, most women were willing to use new fuels but continued using existing fuels simultaneously, due to a lack of awareness of the health impacts (WRI).
Humanitarian settings	• During 2014-2016, Nigeria experienced an increase of over 1 million internally displaced persons as a famine swept through the northeastern part of the country (UNHCR). Women and children are more vulnerable to the impacts of this famine, which has exacerbated the high levels of gender inequality and gender-based violence (Reliefweb 2017).

B. TANZANIA

ENERGY ACCESS IN TANZANIA

16%
of the population has electricity access

2%
of the population has clean cooking access

75/100
score on energy access policy

Among SEforALL's high-impact countries in Africa, Tanzania has the lowest level of access to clean cooking and is among the 20 countries in Sub-Saharan Africa where over 90 percent of the population cooks with solid biomass (IEA 2017a). Most cookstoves burn charcoal or other biomass (Ministry of Energy and Minerals 2015) and securing this biomass forces women to regularly travel out a distance of 10 kilometers in some areas (Sovacool 2012).

Tanzania also falls in the lower half of electricity access penetration (SEforALL 2017). The number of Tanzanians with access to electricity has increased over the last 15 years but, due to population growth, the proportion of people lacking access has remained stable. Tanzania has one of the world's poorest populations and infrastructure development for electrification is made difficult by low population density across a vast expanse of its territory. The national grid only covers part of the country, while some district capitals are powered by diesel generators (Bensch et al 2016). Hydropower is currently the largest contributor to the country's renewable energy, with new wind and solar coming online (World Future Council 2017).

Tanzania has an electrification target of 75% by 2030 and has prioritized decentralized energy solutions in its approach to electrification. Government steps to embrace decentralized solutions include eliminating import tariffs on solar panels, planning for integration of mini-grids with the central grid, and efforts to increase transparency to reduce private sector risk (IEA 2017). Promoting gender equality is an explicit aspect of Tanzania's energy policy and the government's rural energy agency has launched an initiative on gender and energy (Ministry of Energy and Minerals 2003).

GENDER EQUALITY IN TANZANIA

- On the gender development index (health, education, command over economic resources), Tanzania scores 0.937 out of 1.00.

- On the African development bank gender equality index (economic opportunities, human development, law & institutions), Tanzania scores 64.2 out of 100.

- 0n the global gender gap index (economic participation and opportunity, educational attainment, health and survival, political empowerment), Tanzania scores 0.700 out of 1.00 (68th out of 144 countries).

Tanzania has adopted strong policy frameworks to support gender equality. Women now hold 36 percent of parliamentary seats (UNDP 2016b), backed by a law that mandates 30 percent of elected positions be reserved for women (UN Women 2015). Women's attainment of secondary education, at 10 percent, is close to men's level of secondary education at 15 percent (UNDP 2016b). While the country has one of the highest rates of female labor force participation on the continent—at 74 percent compared to 83 percent for men—women tend to be in low-paying occupations or self-employed in the informal sector (African Development Bank 2015). Where gender inequality persists is in access to and ownership of land, all levels of decision-making, participation in the paid economy, and gender-based violence (UNDP Tanzania). For women in rural areas, household and

productive energy needs go unmet because women are not consulted and the cost of electricity is too high (Kigodi and Poncian 2015). The proliferation of mobile money in Tanzania could offer positive prospects for increasing women's agency in the energy arena.

From a policy perspective, energy and gender have been interlinked. Tanzania's national gender strategy recognizes the importance of better energy technologies for alleviating women's burden and encourages increased use of appropriate technologies by communities (NGSEN 2017). Tanzania's national energy policy points to gender as a cross-cutting issue and promotes equality in employment (NGSEN 2017). However, reviews of Tanzania's national gender policies found a lack of clear implementation plans and budgetary allocation (Acosta Frances et al 2017), and gender inequalities in energy access remain entrenched (Kigodi and Poncian 2015).

HOW THE TRENDS IMPACT ENERGY ACCESS IN TANZANIA	
Decentralized energy	• The decentralized market segment in Tanzania is growing. There is a thriving market for off-grid solar home systems and sales during 2015-2016 put Tanzania in the top five countries for these systems worldwide (IEA 2017a). • A growing mini-grid market has increased the opportunity for businesses and households to access energy (Odarno et al 2017). • Tanzania has one of the strongest mobile money systems in Africa, which has enabled the spread of PAYG solar systems (GSMA 2017).
Affordability	• Solar home systems, mini-grids, and high-power appliances are more affordable to rural consumers when the government provides clarity on grid expansion plans, sets appropriate tariff structures, and simplifies permitting processes. These steps have evened out the unit cost of electricity for decentralized systems, which is typically higher than a grid tariff. (IEA 2017a). • A reduced tax on LPG has helped make it more competitive with other cooking fuels, significantly decreasing the country's use of charcoal and firewood, but the cost leaves LPG still out of reach for low-income and most middle-income households (Ministry of Energy and Minerals 2015).
Mobile Payments	• In 2017, less than 20 percent of the rural population had electricity access, yet 70 percent of the rural population had mobile phones. In 2014, 62 percent of those not using their traditional bank accounts were nonetheless making mobile transactions (Demirguc-Kent et al 2014). • Paired with the country's increase in off-grid energy options, mobile money could accelerate women's access to modern energy. A first step may be to tackle the gender gap in mobile accounts in developing economies—at 9 percentage points between men and women as of 2014 (Demirguc-Kent et al 2014).
Entrepreneurship	• In 2012, 54 percent of enterprises were women-owned and over 99 percent of these were micro-enterprises, often with just one employee. There is a significant gender gap in mobile financial accounts: 27% of women have one, compared to 38% of men (Demirguc-Kent et al 2014). • Nationally, support for entrepreneurs is geared toward larger businesses. Training opportunities rarely take women's needs into consideration, nor do they address the needs of informal businesses. • The service and retail sectors where women predominate attract less funding and women encounter difficulties in obtaining collateral for loans. • While the country's legal and regulatory system supports women's economic empowerment, the challenge is in implementation, as women are too often unaware of their rights, face social pressures, and deterred by traditional practices from getting an education, being employed, owning property, or registering a business (Mori 2014).
Urbanization	• Only five countries in the world have a higher rate of urban population growth than Tanzania. • About 80 percent of urban residents live in informal settlements, making it more difficult and expensive to extend infrastructure and services (Alber and Cahoon 2016), resulting in only 46 percent of the country's urban population having access to electricity (Bensch et al 2016). • The largest city, Dar es Salaam, accounts for 60 percent of the country's energy demand (Worrall et al 2018). • The urbanization process may create opportunities for women's increased access to land and finance and allow them to leave behind customary norms in rural areas that are biased against women (World Bank 2007). However, due to urbanization and high prices or scarcity of alternative energy sources, charcoal consumption is expected to continue a sharp upward trend through 2030 (MEM 2003). The burdens of hauling firewood and cooking in kitchens with indoor air pollution largely fall to women.
Humanitarian settings	• Two of the world's largest refugee camps are in Tanzania (UNHCR 2015). In Nyarugusu refugee camp, households spend an average of $140 per year and 19 hours per week on firewood collection. • If all households in Nyarugusu were to use LPG stoves, subsequent time savings are projected to unlock the entrepreneurial potential of camp residents (Rivoal and Haselip 2017).

C. BANGLADESH

ENERGY ACCESS IN BANGLADESH

62%
of the population has electricity access

10%
of the population has clean cooking access

68/100
score on energy access policy

Bangladesh is projected to reach universal electricity access by 2030, thanks largely to solar home systems that have been deployed with the help of government subsidies and loans. Over half of the population of Bangladesh currently has access to electricity, 90 million of whom gained access since 2000. Accompanying the growing maturity of the off-grid market is an increased private sector interest in mini-grids and a government plan to rapidly expand the grid. Bangladesh has the largest market for stand-alone photovoltaic systems (REN21 2017). However the government-backed financing program that has successfully driven uptake of off-grid solar is now competing with rapid grid expansion, competition from unregulated operators, and a weakening of the market demand, due to provision (by a different government agency) of free solar home systems (Shakya and Byrnes 2017).

Demand for off-grid energy remains strong and now that many consumers have basic energy access, there is a need to power their small businesses, agricultural appliances, and community facilities and street lights (Practical Action 2017). Bangladesh's energy solutions are advanced enough to incorporate other support for people's livelihoods, such as pumps for irrigation that could be transformative in women's lives.

Bangladesh recently made strides in distributing clean cookstoves and installing domestic biogas systems using animal waste, but still remains one of the few countries in Asia with clean cooking access below 20 percent (IEA 2017a).

GENDER EQUALITY IN BANGLADESH

- On the gender development index (gender equality in health, education, command over economic resources), Bangladesh scores 0.927 out of 1.00.

- On the global gender gap index (economic participation and opportunity, educational attainment, health and survival, political empowerment), Bangladesh scores 0.719 out of 1.00 (47th out of 144 countries).

Bangladesh has improved on women's political participation but economic participation lags behind. While women in Bangladesh have a similar level of secondary education to men, and women have a higher rate of literacy, their participation in the labor market is much lower—at 43 percent compared to 81 percent for men (UNDP 2016c). The government's solar home system program's success brought a number of positive gains for women and girls, such as the reduction of kerosene consumption, reduced cost of lighting, reduced time collecting fuel, increased schoolwork after dark, and greater decision-making power for women in rural areas (Khandker et al 2014). In 2013, the Energy Ministry launched a clean cooking plan responding to the impact of household air pollution on women's empowerment and maternal health, seeking to leverage government funding to finance women-led cookstove businesses (GACC 2013). Since then, more than 1.3 million traditional cooking stoves have been replaced with improved stoves, but many households remain unwilling to change technology and more coordination is needed between the multiple agencies working on cookstoves (Daily Star 2017).

HOW THE TRENDS IMPACT ENERGY ACCESS IN BANGLADESH	
Decentralized energy	• The continued expansion of off-grid solar in Bangladesh rests on the government's ability to align the configuration of its off-grid solar program with its social safety net efforts. The challenge is to neither undermine the commercial market nor neglect the energy needs of the poorest, who can't afford the steep upfront cost of a solar home system. • Solar home systems in Bangladesh have been shown to lower kerosene consumption, provide health benefits, and increase women's decision-making ability (Samad et al 2016). • Women in Bangladesh benefit from greater exposure to information via television and radio powered by solar home systems (Khan et al 2014). • Loan agreements for solar home systems are usually made with male heads of household (Khandker et al 2014), suggesting that the lessons of women's empowerment modeled by the country's micro-finance sector have not influenced the government's energy strategy (Esty 2014).
Affordability	• The introduction of solar home systems in Bangladesh has freed up additional disposable income for women, partly due to lowered household expenditure on kerosene (Khandker et al 2014). • The pairing of efficient appliances with solar home systems has also translated into savings, as women can conserve energy supply from solar home systems in support of other household and productive activities (Groh et al 2016).
Mobile Payments	• PAYG has not been widely used for solar home systems and mini-grids in Bangladesh, but as of early 2017 these models are now a mandatory component of solar home systems (SEforALL 2017a). • While the country already has nearly universal network coverage (SEforALL 2017a), a recent index ranked Bangladesh's current digital economy at the very bottom of global performance, but in eighth place globally for the rapid pace of technological advancement (Chakravorti and Chaturvedi 2017). • Bangladesh has one of the most promising markets for mobile-enabled energy services (Nique 2013).
Entrepreneurship	• While having a higher rate—32 percent—of women's business ownership than many other countries (Mastercard 2017), Bangladesh performs on the lower end of women's access to credit, property other than land, and inheritance practices (Sary 2016). • Among women owners of small and medium enterprises who responded to one survey, 76 percent of them were not aware of government or financial institutions programs that provide support, 69 percent faced the barrier of collateral requirements, and 77 percent had trouble with loan applications due to poor financial records and financial literacy (Singh 2016).
Urbanization	• A significant share of Bangladesh's population is living in slums. Because the off-grid solar market is highly saturated in Bangladesh and there are problems with grid reliability, many solar enterprises are focusing on expanding their businesses in urban areas, providing households who can afford it with a backup/supplement to their grid connection (SEforALL 2017a). As the market increases in slums and urban areas, measures are needed to ensure solar home systems are affordable to women and slum dwellers in general.
Humanitarian settings	• Since August 2017, violence driving Rohingya Muslims out of Myanmar has quickly created the world's most densely populated settlement of refugees in Bangladesh, near Cox's Bazaar. • Among the more than 800,000 Rohingya settled in refugee camps and satellite areas in Bangladesh, cooking fuel is as scarce as food and sanitation facilities. Refugees rely mainly on collecting wood from nearby forests, since growing demand has driven up the cost of cooking fuel in markets significantly (FAO 2017 and Reuters 2017).

D. MYANMAR

ENERGY ACCESS IN MYANMAR

52%
of the population has electricity access

9%
of the population has clean cooking access

59/100
score on energy access policy

The poverty rate in Myanmar is estimated at 26 percent overall, reaching as high as 70 percent in rural areas. Nonetheless, the country has been making progress in alleviating poverty and is one of the fastest growing economies in East Asia (World Bank 2017a).

In Southeast Asia, one-third of the 65 million people without electricity access are in Myanmar, and millions more rely on diesel generators to make up for unreliable connections. About half of Myanmar's population is connected to electricity (SEforALL 2017). While all other countries in Southeast Asia are projected to reach universal electricity access by 2030, Myanmar is not expected to achieve this goal, alongside Lao PDR and Cambodia (IEA 2017a).

Myanmar is also one of the four countries in Asia—alongside East Timor, Lao PDR, and Solomon Islands—where more than 90 percent of the population cooks with biomass (IEA 2017A). Expanding clean cooking will require large-scale investments in clean fuels infrastructure, improving market access for possible suppliers, and building demand by raising awareness on the health and environmental impacts of existing cooking methods (Emerging Markets 2015).

GENDER EQUALITY IN MYANMAR

- On the global gender gap index (economic participation and opportunity, educational attainment, health and survival, political empowerment), Myanmar scores 0.691 out of 1.00 (83rd out of 144 countries).

In Myanmar, a greater proportion of women than men (27 percent compared to 20 percent) have secondary education, and women's labor force participation is nearly as high as that of men. Improvements have been seen in women's access to credit, literacy, and maternal mortality (ADB 2016). However, inequalities remain in income and skill levels (UN Women 2017) and women make up only 13 percent of parliament. Gender equality is enshrined in Myanmar's constitution and there are mechanisms to address this at national and subnational levels, but gaps remain in legal protections for women (UNDP 2016a). Myanmar's 2014 energy policy notes that due to women's roles as primary energy users, renewable energy projects will not succeed without their active involvement. The government proposes an entrepreneurship program extending microfinance to women with specialized financing options and waiver of fees (NEMC 2014).

HOW THE TRENDS IMPACT ENERGY ACCESS IN MYANMAR	
Decentralized energy	• Myanmar's electrification plan, launched in 2014, prioritizes grid connections. • One of the primary investment challenges to expanding off-grid systems in Myanmar is a consumer base that is not accustomed to paying for energy services, due to the ease of securing technologies that are heavily subsidized or poor quality. Government and donor subsidies to alleviate the cost of solar home systems can be as high as 90 percent, making it difficult to convince consumers to pay more than the subsidized cost. • Businesses looking to sell solar home systems or solar lighting devices must compete with cheap and low quality options that have flooded the market, mostly from China. • With a market that is deemed no longer viable, companies have moved away from solar home systems and toward micro-grids or utility-scale projects. • The clean cooking sector is in its infancy and not yet supported by government programs (SEforALL 2017a).
Affordability	• Grid connections can cost up to US $900, which is out of reach for many households (IIED 2016 and World Bank 2016). • One study testing the applicability of Bangladesh's model of private partnership microfinance in the context of Myanmar found that the rural poor could pay as low as US $6.40 per month to own a solar home system within a few years, if accompanied by cost adjustments in the National Electrification Plan, strong local presence from retailers, and effective after sales service (Newcombe and Ackom 2017).
Mobile Payments	• Myanmar's growing telecommunications sector could be an advantage to the off-grid market. • Uptake of mobile phones has increased rapidly in Myanmar, reaching about 61 percent of the adult population as of 2016 (Hurulle et al 2017). • Women in Myanmar are 29 percent less likely to own a mobile phone than men and this gender gap in ownership is more pronounced in low-income households. • The country's approach to digital financial inclusion will likely be driven by mobile network companies alone (Koh et al 2018), which could be an opportunity for reducing the gender gap in mobile phone coverage.
Entrepreneurship	• Women's labor market participation in Myanmar—75 percent of women over the age of 15—is one of the highest rates in the world. • In a 2014 survey, women made up 30 percent of senior management positions in formal businesses and 27 percent of these businesses have women among their owners (World Bank 2016a). • Few citizens—women or men—have access to bank accounts (Demirguc-Kunt et al 2015). • A study of the viability of women-led solar enterprises in Myanmar found that the potential was driven largely by broader gender dynamics, including issues of empowerment, health, education, and representation, and women are at a disadvantage due to socio-cultural and economic factors (Pascale et al 2016).
Urbanization	• In Myanmar, urban electrification increased rapidly from 65 percent in 2013 to 86 percent in 2014 (SEforALL 2017). • Slum households in Yangon mostly rely on charcoal and firewood for cooking, or as a secondary source of fuel after grid electricity. • LPG is not used in these households due to a lack of infrastructure for the fuel in the country, which entails prohibitive installation cost, lack of awareness, and inaccessibility of LPG outlets. • Electricity supply from the grid is prevented by the illegal settlement status of slums, the cost of meter installation, and the distance from a grid connection (Folke Center).
Humanitarian settings	• The Rohingya Muslim crisis that is currently driving refugees over the border to Bangladesh has negatively impacted human security and energy access (FAO 2017 and Reuters 2017).

E. HAITI

ENERGY ACCESS IN HAITI

38%
of the population has electricity access

9%
of the population has clean cooking access

13/100
score on energy access policy

Haiti is the poorest country in Latin America. Highly vulnerable to the impact of natural disasters, Haiti's population has been subjected to some of the world's most serious crises of poverty and health in the wake of recent earthquakes and hurricanes. The country's population accounts for 43 percent of those without electricity access in the entire region. Less than half of the urban population has access to electricity and only about 7 percent of the rural population does (Di Bella and Grigoli 2016). Electricity infrastructure is not well maintained and there is no nationwide grid (Worldwatch 2014), due to electricity theft and non-payment (Di Bella and Grigoli 2016). Haiti is the only Latin American country where more than 90 percent of the population cooks with solid biomass (IEA 2017a). Household air pollution is the second largest risk factor for mortality in the country after dietary risks (GACC 2017). To build a market for clean cooking, Haiti needs to strengthen enterprises, attract investment to the sector, increase access to consumer finance, and build institutional capacity (GACC 2017). Lowering trade barriers would be a helpful step (GACC 2016a).

GENDER EQUALITY IN HAITI

- On the gender inequality index (reproductive health, empowerment, labour market), Haiti scores 0.593 out of 1.00

Women's participation in the labor market is 61 percent, next to 71 percent for men. Women make up only 3.5 percent of parliamentary positions and about one quarter of women have secondary education (UNDP 2016a). The country's constitution includes workplace and gender-based violence protections for women, and newer legislation at national and subnational levels require a 30 percent quota for women (USAID Haiti 2017), but protections are missing on income equality and domestic violence (GACC 2016). The national energy sector development plan does not address gender equality (USAID 2016).

HOW THE TRENDS IMPACT ENERGY ACCESS IN HAITI	
Decentralized energy	• One analysis estimates that with an investment of $7 billion, Haiti could reach near universal electrification via decentralized renewable energy by 2030, but investment is stymied by limited infrastructure, disputed land ownership, political instability, and natural disasters (Worldwatch Institute 2014). • In the aftermath of the 2010 earthquake, many people lost their cookstoves and instead burned debris or trees in the capital, the minority of the population that was using gas or electricity were forced to switch back to charcoal or firewood, and the cost of charcoal became unaffordable to those who lost their assets and employment (WFP and WRC 2010).
Affordability	• While a significant portion of the gross domestic product is devoted to importing petroleum for electricity generation, hydropower and solar are relatively cheap sources of power generation. • Affordability of any energy supply is the main hurdle, as many Haitians are unable or unwilling to pay the electric utility Worldwatch Institute 2014). • Financing the high upfront cost of a cookstove is also prohibitive. LPG systems cost over $100, which is far more than what most Haitians can afford (GACC 2016a).
Mobile Payments	• Mobile money is of interest to many Haitians because it circumvents problems with storing money securely and inaccessible infrastructure (Taylor et al 2011). • One micro-grid operator in Haiti, EarthSpark caters to its customers by imposing no minimum load payment requirements and allows customers to buy pre-paid electricity credits from a local agent or mobile phone when they can afford to do so (Moreno Bareisaite 2015).
Entrepreneurship	• With the majority of the country living below the national poverty line and one quarter living in extreme poverty, Haitian women entrepreneurs primarily seek opportunities for the smallest of enterprises. • The predominance of Haitian women in local markets influenced the design of the country's largest microfinance institution, Fonkoze, whose more than 555,000 active borrowers are women (Fonkoze). As of 2014, the organization was the only domestic bank to finance a renewable energy business (Worldwatch Institute 2014), and now partners with IFC to insure low-income micro-entrepreneurs against natural disasters (World Bank 2017c).
Urbanization	• As of 2014, 74 percent of Haiti's urban population lived in slums, an improvement from 93 percent in 2000 (UN-Habitat). • In Haiti's context, the energy needs in urban areas are so vast that it is a struggle to make rural development a priority (Friedman 2013). • About one-third of the 4 million metric tons of wood products used as charcoal in Haiti are used for cooking by the urban population (USAID 2017). • One innovation that has gained traction in an urban center in Haiti is a micro-utility, supported by solar and wind energy and financed by consumers through smart meters (Peters 2016).
Humanitarian settings	• Several years following the Haiti earthquake, households are still caring for displaced family members, which doubled or tripled the cost of fuel (WFP 2012). • Several humanitarian organizations have distributed solar technology to the camps where thousands still live after the earthquake. Electricians Without Borders installed 600 street lamps (McKenzie, A.D. 2014).

V. CONCLUSION

Through this report, SEforALL and ENERGIA seek to inspire policymakers and others to ensure that both women's and men's needs and contributions are addressed in the expansion of energy access. But this scoping study is only a preliminary step. To leave no one behind—and specifically no woman behind—we invite our partners to join us in pursuing further research and data collection on these trends within specific countries, and to share best practices for achieving the parallel goals of energy access and gender equality.

ANNEX 1:

CRITERIA USED TO SELECT GLOBAL TRENDS AND COUNTRY CASE STUDIES

Criteria used to select and prioritize global trends include:

- Global significance and magnitude of the trend, including any evidence of the trend's urgency.
- Availability of evidence to demonstrate correlation to gendered and inclusive access to electricity and clean cooking.
- Balance of trends that are economic, social, or technological in nature.
- Readiness of interventions that could be pursued by policymakers and, secondarily, other actors in the external audience.
- Potential alignment with the mandates of project partners SEforALL and ENERGIA.

- Criteria used to select country case studies include:
- SEforALL "high-impact" countries for clean cooking and electrification.
- Countries demonstrate how the global trends play out in diverse situations of economic growth, development, and relevant policies including those on gender.
- Countries represent high and low energy access deficits.
- Countries are spread geographically across regions and subregions.
- Evidence and data are more readily available.

ANNEX 2:

GLOSSARY

Clean Cooking Solutions: Clean and improved fuels and technologies for cooking. This includes advanced biomass stoves and fuel infrastructure; alcohol stoves and fuel infrastructure; biogas digesters; electric stoves; improved biomass stoves; liquefied petroleum gas stoves and fuel infrastructure; natural gas stoves and fuel infrastructure; solar cookers.

Decentralization of Energy Services: Energy produced close to where it will be used, rather than at a large plant elsewhere and sent through a grid. Local generation reduces transmission losses and lowers carbon emissions. Security of supply is increased, as customers don't have to share a supply or rely on relatively few, large and remote power stations.

Digitalization: The use of digital technologies to change a business model and provide new revenue and value-producing opportunities.

Electrification: The process of powering by electricity and, in many contexts, the introduction of such power by changing over from an earlier power source.

Energy Access: The ability of the end user to utilize energy supplies.

Energy Poverty: A lack of access to modern energy services. It refers to the situation of large numbers of people in developing countries and some people in developed countries whose well-being is negatively affected by very low consumption of energy, use of dirty or polluting fuels, and excessive time spent collecting fuel to meet basic needs. It is inversely related to access to modern energy services, although improving access is only one factor in efforts to reduce energy poverty. Energy poverty is distinct from fuel poverty, which focuses solely on the issue of affordability.

Gender Equality: When women and men enjoy the same rights and opportunities across all sectors of society, including economic participation and decision making, and when the different behaviors, aspirations, and needs of women and men are equally valued and favored.

Gender: Refers to the socially constructed characteristics of women and men—such as norms, roles, and relationships of, and between, groups of women and men. It varies from society to society and can be changed.

Entrepreneurship: The activity of setting up a business or businesses, taking on financial risks in the hope of profit.

High-Impact Countries: The 20 countries with the highest absolute gaps in access to electricity measured by population, as identified in the 2017 Global Tracking Framework (IEA and the World Bank, 2017), the latest available data at the time this research was commissioned. For electricity access the countries are: Angola, Bangladesh, Burkina Faso, Chad, Congo (DR), Ethiopia, India, Kenya, Korea (DPR), Madagascar, Malawi, Mali, Mozambique, Myanmar, Niger, Nigeria, South Sudan, Sudan, Tanzania, and Uganda.

Humanitarian Settings: A range of situations including natural disasters, conflict, slow- and rapid-onset events, rural and urban environments, and complex political emergencies in all countries.

Internet of Things: The interconnection via the Internet

of computing devices embedded in everyday objects, enabling them to send and receive data.

Land Tenure: The legal regime in which land is owned by an individual, who is said to "hold" the land.

Mini-Grid: A set of electricity generators and possibly energy storage systems interconnected to a distribution network that supplies electricity to a localized group of customers. They involve small-scale electricity generation (10 kW to 10MW) that serves a limited number of consumers via a distribution grid that can operate in isolation from national electricity transmission networks.

Pay-As-You-Go: A system of paying for a service before it is used. In the energy sector, Pay-As-You-Go business models are increasingly paired with decentralized energy technologies and services.

Pico Solar: Pico solar systems are much smaller and cheaper than traditional solar systems but have the potential to provide useful amounts of electrical power to charge the increasing number of low-power gadgets. Typically, pico solar cells have power outputs ranging from as little as 0.1 watts-peak (Wp) to 5 watts-peak.

Productive Uses of Energy: Activities that involve the use of energy—both electric, and non-electric in the forms of heat, or mechanical energy—for activities that enhance income and/or welfare.

Renewable Energy: Energy that is collected from renewable resources, which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat.

Small and Medium Enterprises: Non-subsidiary, independent firms which employ fewer than a given number of employees, which varies across countries. The most frequent upper limit designating an SME is 250 employees, as in the European Union.

Social Inclusion: The process of improving the terms on which individuals and groups take part in society—improving the ability, opportunity, and dignity of those disadvantaged because of their identity.

Solar Home Systems: Stand-alone photovoltaic systems that offer a cost-effective mode of supplying amenity power for lighting and appliances to remote, off-grid households.

Urbanization: Gradual increase in the proportion of people shifting from rural to urban areas, and the ways in which each society adapts to the change.

Women's Empowerment: The ability for women to enjoy their rights to control and benefit from resources, assets, income, and their own time, as well as the ability to manage risk and improve their economic status and well-being.

ANNEX 3:

CONSULTATIONS

Safiatou Alzouma Nouhou, IRENA, United Arab Emirates

Dipal Barua, Bright Green Energy Foundation, Bangladesh

Kathleen Callaghy, Global Alliance for Clean Cookstoves, US

Elizabeth Cecelski, ENERGIA Technical Advisory Group, US

Jean DCunha, UN Women, Myanmar

Soma Dutta, ENERGIA, India

Habiba Eyiomo Ali, Sosai Renewable Energies Co., Nigeria

Ben Garside, IIED Sustainable Markets Group, UK

Megan Gerrard, Safe Access to Fuel & Energy (SAFE), US

Amy Grindle, DFID, UK

Daniel Hoornweg, University of Ontario Institute of Technology, Canada

Caitlyn Hughes, Solar Cookers International, US

Vahid Jahangiri, International Lifeline Fund, USA

Mark Konold, Worldwatch Institute

Najada Kumbuli, Calvert Foundation, Calvert Impact Capital

Sixbert Manga, Climate Action Network, Tanzania

Zdenka Myslikova, Tufts University, US

Anthony Ngororano, UN Women, Haiti

Shonali Pachauri, International Institute for Applied Systems Analysis, Austria

Katie Pogue, Global Alliance for Clean Cookstoves, US

Ram Prasad Dhital, Alternative Energy Promotion Center, Nepal

Seemin Qayum, UN Women

Joni Seager, Bentley University, US

Ajaita Shah, Frontier Markets, India

Youba Sokona, The South Centre, Switzerland

Carlos Sordo, Practical Action, UK

Kate Steel, Power Africa/USAID, US

Emma Stewart, DFID, UK

Charlotte Taylor, Practical Action, UK

Michael Toman, World Bank, US

Molly Walton, International Energy Agency, France

Laura E. Williamson, REN21, France

Tanja Winther, University of Oslo, Norway

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CONTACTS

Headquarters
Andromeda Tower 15th floor, Donau City Strasse 6
1220, Vienna, Austria

Satellite Office
1750 Pennsylvania Avenue NW, Suite 300
Washington, DC 20006, USA

Email: **info@SEforALL.org**
Website: **www.SEforALL.org**
Twitter: **https://twitter.com/SEforALLorg**