

Powering Equality

Women's entrepreneurship transforming
Asia's energy sector



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Foreword

With less than a decade left to achieve the Sustainable Development Goals, we are at an inflection point. COVID-19 has brought mass unemployment alongside an extreme economic downturn. Though our headlines are now dominated by the pandemic, the climate crisis has never gone away. This pandemic is merely a preview of the potential upheaval that climate change can bring.

In times like these, inequality, especially in developing economies, continues to exacerbate. It is women, often the backbone of vulnerable communities, who are expected to shoulder the burden of survival and recovery.

The energy sector presents one of our biggest opportunities to change this status quo and build resilience for all. By 2030, renewable energy sources are likely to power over 60% of new access to electricity. New ways of delivering energy through off-grid and mini-grid systems are democratizing access to electricity and is giving women and vulnerable communities, new economic freedoms.

While we have seen great jumps in electrification across the Asia-Pacific region, last-mile consumers in many rural areas are still falling through the cracks. As we aim to build back better from the pandemic, women's businesses in the energy sector can help scale up decentralized energy systems to reach these communities and power households and essential services. From influencing purchasing decisions to accessing new and often impenetrable markets to diversifying the sector, women are vital agents of change. We need to invest in their experience and leadership in championing for a renewables-based recovery.

This will require innovation, but we don't have to reinvent the wheel. Asia and the Pacific boasts of a wealth of experience in growing enterprises for climate action. "Powering Equality: Women's entrepreneurship transforming Asia's energy sector" is an initiative by the joint UN Environment Programme-UN Women project- EmPower: Women for Climate-Resilient Societies to capture the evidence and lessons that make the case for investing in women-led energy enterprises and supply chains. The report considers various business models spanning across sectors like agriculture, WASH, public infrastructure, nutrition and the policy environment that can reinforce this.

This recovery is presenting an opportunity to double down on the fight against climate change and make the new normal a better one. We must seize this opportunity while we can and empower women entrepreneurs for a resilient future.



Dechen Tsering

Regional Director and Representative
for Asia and the Pacific, United Nations
Environment Programme

Acronyms

A breakdown of acronyms you will encounter throughout this publication.

| | |
|--------------|---|
| APEC | Asia Pacific Economic Cooperation |
| ASEAN | Association of Southeast Asian Nations |
| BDS | Business development services |
| CREE | Community Rural Electrification Entities |
| GBA | Global Banking Alliance for Women |
| DREA | Decentralized renewables for energy access |
| GHG | Greenhouse gases |
| ICT | Information and communication technologies |
| IDCOL | Infrastructure Development Company Limited |
| IFC | International Finance Corporation International Finance Corporation |
| MSME | Micro, small and medium enterprises |
| NAMA | Nationally Appropriate Mitigation Action |
| NAP | National Adaptation Plan |
| NDC | Nationally determined contributions |
| NGO | Non- governmental organization |
| REDD | Reducing emissions from deforestation and forest degradation |
| RE | Renewable energy |
| SDC | Sustainable Development Goal |
| SME | Small and medium enterprises |
| STEM | Science, Technology, Engineering and Mathematics |
| SURE | Sakhi Unique Rural Enterprise, India |
| UNEP | United Nations Environment Programme |
| WEE | Women's Economic Empowerment programme of ENERGIA |

Key messages

This publication examines energy access and the need to strengthen the livelihoods of the poor, especially women, in Asia. More critical today than ever before, as governments prepare to deal with the economic and human crisis that COVID 19 has brought with it, promoting women's entrepreneurship in renewable energy provides a unique opportunity to achieve inclusive growth and climate resilience.

- 01** Achieving SDG7, i.e. universal access by 2030 to affordable, reliable, sustainable and modern energy services, is essential for achieving other SDGs, including those related to gender equality, health, poverty reduction, climate and environment. Vice-versa, gender equality and women's empowerment are fundamental to achieving universal energy access.
- 02** In developing countries, women bear most of the responsibility for household tasks such as collecting water and firewood, cleaning and washing, bearing 60-80% of unpaid domestic work globally. At the same time, as informal workers and entrepreneurs, women are earning less, saving less, and holding more insecure jobs. Since the outbreak of COVID 19, unpaid care work in homes is increasing due to social distancing practices, school closures and home schooling, heightened care needs of older and sick people, and more cooking being done at home.
- 03** The energy sector is experiencing a fundamental shift towards a renewable, decarbonized energy system. Moving forward, decentralized renewables for energy access (DREA) systems will play a pivotal role in meeting universal energy goals.
- 04** DREA systems provide good opportunities to open new economic potential for the poor, unlock resilient livelihoods for communities, and help to reduce greenhouse gas emissions. Access to electricity for irrigation, processing equipment or early warning systems entails significant benefits to increase the resilience of farmers, including women. Solar-powered pumps are being utilized to provide water for irrigation, ensuring crop yields and food security for women farmers. Solar dryers, micro-hydro grain mills, solar grinders and solar refrigeration systems are used for agro-processing, storage and adding value to products, while reducing the labour and time spent, for example, by women in manual processing and collecting water.

- 05** As DREA technologies increasingly become the cost-effective energy option for the poor, women entrepreneurs have enormous potential to create distribution and service networks in rural areas, helping to lower the cost of customer acquisition and increasing access to energy.
- 06** By leveraging their social networks, women bring a unique value proposition to facilitate last-mile distribution points for energy services. Recognizing this, several actors, including NGOs, private sector organizations, and donors, are investing in promoting women as entrepreneurs, selling renewable energy (RE) technologies, especially to rural communities, including women.
- 07** Besides helping to address energy access gaps for the un- and under-served, this approach builds women's leadership and expands their economic opportunities, thereby helping overcome poverty, reducing inequalities, challenging deep-rooted gender norms and promoting environmental sustainability.
- 08** Even though the women's energy entrepreneurship approach is gaining traction, it is yet to be taken up at a scale that can make a significant difference to the prevailing energy access gap. Concerted action is needed on multiple fronts, including policy, capacity-building, access to technology, finance and markets, while learning from and consolidating ongoing efforts.
- 09** The project EmPower: Women for Climate Resilient Societies of UNEP and UN Women is one such innovative project: it supports women entrepreneurs in renewable energy in Bangladesh, Cambodia and Viet Nam by combining actions on policy (gender responsive energy policies, provincial action plans, approach papers), on-the-ground pilot projects (capacity building and access to financial instruments), and sharing knowledge locally, nationally and regionally.



Photo: Abbie Traylor-Smith / DFID

Introduction

The 2030 Agenda for Sustainable Development, adopted in 2015 by the UN General Assembly, provides an ambitious roadmap to eradicate poverty and achieve sustainable development for all. The Agenda is unique in that the goals are integrated and indivisible, balancing various dimensions of sustainable development and pledging to *leave no one behind*. A global political commitment to ensure access to affordable, reliable, sustainable and modern energy for all is articulated via SDG7. Achieving SDG7 is also seen as essential for achieving other SDGs, including those related to gender equality, health, poverty reduction, climate and environment. Noting that “gender equality and the empowerment of women and girls will make a contribution to progress across all the goals and targets”, the Agenda includes a dedicated goal on gender equality (SDG5), with targets on valuing unpaid care and domestic work; women’s equal rights to economic resources; full and productive employment and decent work; and equal pay for work of equal value (United Nations, 2015). Another important feature is the prominence of environmental sustainability with several goals dedicated to specific environmental challenges (e.g. Goals 13, 14, 15).



Photo: Asian Development Bank

In recent years, several countries made significant progress in expanding electricity access¹ to their people, contributing towards the achievement of SDG7. According to the 2019 SDG7 Tracking report, the global electrification rate reached 90% in 2018 (from 83% in 2010). However, efforts in delivering clean cooking fuels and technologies² to people did not match up and during the same period, the share of the global population with access to clean cooking energy increased only from 56% to 63%. In 2018, 789 million people were still living without electricity, and 2.8 billion continued relying on solid biomass, kerosene or coal as their primary cooking fuel (IEA et al 2020). This means nearly a third of the global population continues to be exposed to harmful household air pollution. In the Asia Pacific region, the average electrification rate rose from 80% in early 2000 to 92% in 2017. However, like the rest of the world, the progress in clean cooking energy access has been slower and in 2016, only 60% of the region's population had access to clean cooking energy (REN 21 2019). According to recent projections, 650 million people will still not have access to electricity and around 2.3 billion people will still be without access³ to clean cooking solutions in 2030, 26% of them being in Central and Southern Asia (IEA et al 2019).

¹ Electricity access is defined as availability of an electricity connection at home or the use of electricity as the primary source for lighting (World Bank 2017).

² The notion of clean cooking encompasses the health and environmental impacts of cooking and includes cooking energy solutions based on electricity or gaseous fuels, including liquefied petroleum gas (LPG), or solid/liquid fuels paired with stoves exhibiting overall emissions rates near those of LPG (World Bank 2017).

³ The Sustainable Energy for All (SE4All)'s SE4All Global Tracking Framework defines access to energy as "the ability to avail energy that is adequate, available when needed, reliable, of good quality, affordable, legal, convenient, healthy and safe, for all required energy services across household, productive and community uses" (Angelou 2014).

This year, with the spread of the COVID-19 pandemic, the gains made in the past decades are at risk of being rolled back. At the same time, the pandemic is deepening pre-existing inequalities, exposing vulnerabilities in social, political and economic systems which are in turn amplifying the impacts of the pandemic and threatening livelihoods of millions of people (United Nations 2020b). In every sphere, ranging from health and personal well-being, economy, security to social protection, the impacts of COVID-19 are exacerbated for women and girls simply by virtue of their sex. Women are hit harder by the economic impacts of COVID-19 because they are more likely than men to be working in low-paying informal jobs and in the direct service sector. Insecure livelihoods are making it harder for low-income customers and businesses to pay their electricity bills, threatening them with disconnection. For poor households, the economic slowdown could also cause a return to firewood or other polluting cooking fuels, due to loss of income or disruptions in fuel supply chains (Clean Cooking Alliance 2020). For women who are primarily responsible for collecting cooking fuel, this means a high risk of exposure to gender-based violence while procuring cooking fuels, particularly in humanitarian and fragile settings (United Nations 2020b).

Aside from the implications of COVID 19, the overall context in which energy access interventions are being made has been changing, generating new opportunities and throwing up new challenges. The declining cost of renewable energy⁴ systems; proliferation of affordable, energy-efficient appliances; and the use of mobile platforms are changing the way we think about providing energy access. Technological and business model synergies between clean cooking and electrification (e.g., electric cooking, pay-as-you-go, and results-based financing) are also creating opportunities for integrated approaches that can grow the market (IEA et al 2020). However, gender inequality impedes the leveraging of these trends to expand energy access to those who need it the most: fewer women than men own mobile phones, have access to financing, or even have a voice in household decision making on energy matters (Pearl-Martinez 2020). These realities hinder the potential for achieving universal access to energy and needs to be tackled.

In the current context, securing access to energy and sustainable livelihoods for men and women are more important than ever before (ENERGIA 2020). Majority of the people without access to modern, affordable energy services are poor and live in low income, rural areas in developing countries. Meeting the energy needs of these communities calls for new approaches and transformational efforts at an accelerated scale. One such approach gaining increased recognition is supporting women as entrepreneurs, selling and servicing renewable energy technologies, especially at the last mile⁵. A range of actors, including national and international NGOs, private sector organizations, donors and governments are focusing on promotion of women's entrepreneurship in the energy sector. In striving for universal energy access, women's entrepreneurship is a workable strategy, with gains for communities, for businesses and the private sector, and for governments. The momentum needs to continue, and efforts need to be scaled up.

⁴Renewable energy is energy from natural sources that are replenished at a faster rate than they are consumed, including hydro, bio-energy, geothermal, aero-thermal, solar, wind, and ocean (World Bank 2017).

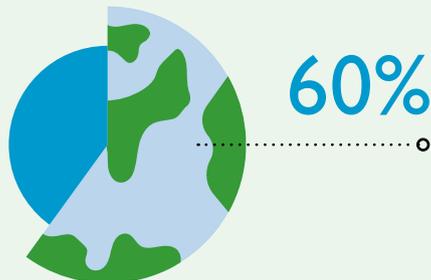
⁵ A working definition for the 'last mile', as adopted by SEforAll and the Global Distributors Collective, is "those that are underserved by the mainstream private sector because they are low income, live in remote areas, or both" (Global Distributors Collective 2019).

Energy access gap in Asia and the Pacific and women's roles

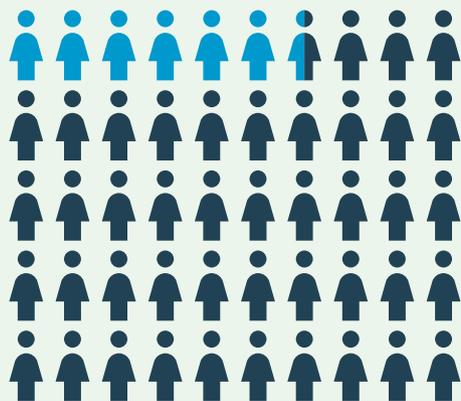
In the Asia Pacific region, the average electrification rate rose from 80% in early 2000 to 92% in 2017. (IEA et al 2020)



789 million people In 2018, 789 million people were still living without electricity, and 2.8 billion continued relying on solid biomass, kerosene or coal as their primary cooking fuel (IEA et al 2020).



However, like the rest of the world, the progress in clean cooking energy access has been slower and in 2016, only 60% of the region's population had access to clean cooking energy (REN 21 2019).



840 million people or **13%** of the global population, are engaged in the part-time collection of wood fuel for subsistence use; and almost 85% of this work is done by women and girls (IRENA 2019)

According to recent projections, 650 million people will still not have access to electricity and around 2.3 billion people will still be without access to clean cooking solutions in 2030, 26% of them being in Central and Southern Asia (IEA et al 2019).



Distributed/ decentralized renewable energy in the hands of women leaders can be the solution.



Last mile users- remote rural communities are falling through the cracks, poor and marginalized people are also struggling without reliable access to energy. Now with COVID-19 and the recovery, the needs will be higher.

About EmPower: Women for Climate-Resilient Societies

EmPower: Women for Climate-Resilient Societies, is a partnership between the UN Environment Programme (UNEP) and UN Women, supported by the Swedish International Development Cooperation Agency that aims to ensure that climate action and disaster risk reduction in Asia-Pacific responds to gender equality and human rights. From 2018 to 2022, EmPower is being implemented regionally across Asia and the Pacific, with on-the ground activities in Bangladesh, Cambodia and Viet Nam.

Through its work on 'Renewable Energy for Women's Resilient Livelihoods', the project supports women in Bangladesh, Viet Nam and Cambodia to use renewable energy technologies to run enterprises that can improve their existing incomes as well as sell renewable energy products to others. Creating an enabling policy environment and providing training, mentorship, financial options and networks for women-led enterprises, this pillar contributes to SDG 1 (Poverty reduction), SDG 5 (Gender Equality), SDG 7 (Affordable and clean energy), SDG 10 (Reduced Inequalities) and SDG 13 (Climate Action).

In this publication

This publication, published under the aegis of the EmPower project, presents an overview of the current state of play of women's entrepreneurship in the renewable energy sector, focusing on Asia. Analyzing current trends and relevant experiences in the region, it offers policy lessons for donors, inter-governmental organizations, national governments and project practitioners including civil society.

After the Introduction in section 1, the paper presents an overview of current trends in the sector in section 2 and in section 3, makes a case for an enhanced role for women as entrepreneurs in the sale and servicing of renewable energy technologies, especially at the last mile. Section 4 is focused on on-the-ground experiences with women's entrepreneurship in the region. Recognizing and mapping the multiple constraints that women entrepreneurs face as compared to men, this section presents a series of case studies, highlighting workable strategies that women's entrepreneurship programmes have adopted, and the results these strategies have had on the lives of women and men, as entrepreneurs, as households and as communities. While the practices and lessons highlighted are context specific, our belief is that in terms of their core essence, they can be applied to varied geographies and social contexts. Drawing from the lessons learnt through these initiatives, section 5 offers lessons to support greater women's participation in the renewable energy sector and identifies specific actions that need to be undertaken by different stakeholders to scale up these efforts.



Gender, energy and climate in global sustainable development agenda

Energy access has been growing, but not everyone is covered yet. A significant number of poor people, women included, continue to be deprived of the benefits of modern energy.

Despite impressive growth in terms of the number of people covered, the spread of energy access efforts continues to be uneven, with a vast majority 80% of the people who gained access since 2010 concentrated in a single region: Asia (IEA 2019a). In Central and Southern Asia, more than 92% of the population had access by 2018 (IEA et al 2020). Among those not connected, Pakistan, Bangladesh and Myanmar have the lowest electrification rates in the South Asia and Southeast Asia sub-regions and face considerable challenges in providing electricity to 20-50% of their populations, who are presently unconnected (REN 21 2019). There is also a major disparity in access between urban and rural areas. In 2018, the un-served rural population of 668 million made up 85% of the global access deficit. Between 2010 and 2018, access to electricity in rural areas grew from 70% to 80%. In urban areas, access is already close to universal (97% in 2018) (IEA et al 2020). In clean cooking, over 450 million people have gained access to clean cooking since 2010 in India and China, as a result of liquefied petroleum gas (LPG) programmes and clean air policies (IEA 2019a). Despite this, developing Asia remains home to around 65% of the global population without access, with 1.7 billion people lacking clean cooking facilities. Seven times more people lack clean cooking access than electricity in this region (IEA 2019a; REN 21 2019). Of the 1.7 billion people in the region who rely on traditional biomass for cooking – 40% of the population – live in

five countries: China, India, Indonesia and Pakistan, and Bangladesh (REN 21 2019). Further, in 2018, the access to clean cooking solutions in urban areas stood at 83% (76–87), only at 37% (30–45) for rural areas (IEA et al 2020). In moving forward, the remaining work in expanding energy access will be more challenging than before, since many of the households left without access are in remote areas such as mountains, islands or isolated hamlets and villages. Reaching the 'last mile' – those who are unlikely to be reached by business-as-usual approaches due to their remoteness, income levels, or social discrimination – is challenging but clearly should not be left till last (Practical Action 2019).

Women and children constitute majority of the world's poorest people. For this reason, gender equity must be made an integral part of efforts to expand modern energy access to and for women and reduce gender inequality and poverty (Pearl-Martinez and Stephens 2016).

Improving access to energy services will improve women's health, well-being and economic empowerment. This can support the achievement of poverty reduction (SDG 1), health and well-being (SDG 3), education (SDG 4), and gender equality (SDG 5).

Women's unpaid work has long been recognized as a driver of inequality. Even before COVID-19 became a universal pandemic, women were doing three times as much unpaid care work as men (United Nations 2020b). In developing countries, women bear most of the responsibility for household tasks such as cooking, collecting water and firewood, cleaning and washing, bearing 60-80% of unpaid domestic work globally (United Nations 2020a&b; ILO 2013; Dutta et al 2017). In the absence of modern energy, the huge amount of time spent by women in these tasks results in physical and emotional depletion and leaves little discretionary time for personal care, leisure, or income generating activities. Since the outbreak of COVID 19, unpaid care work in homes is increasing due to social distancing practices, school closures and home schooling, heightened care needs of older and sick people, and more cooking being done at home (ENERGIA 2020). Meanwhile, women still have to generate an income through paid work. When women earn an income, they are more likely to be informal workers and entrepreneurs; as a result, they earn less, save less, hold more insecure jobs and have less access to social protection (United Nations 2020b).

Modern energy has the potential to improve the well-being of women through multiple channels. For example, energy-based appliances can help save time and effort that can be redirected towards education, social and family activities, livelihood opportunities, self-improvement and leisure. Releasing women's time is an important prerequisite for them to invest in education, to seize economic opportunities, participate in economic, political, and social life (WDR 2012) and to get much-needed rest. While access to energy cannot guarantee gender equality, it would go a long way in relieving women and girls of the drudgery associated with their daily tasks. Fetching fuel, fodder and

water for homes, and manual grinding or pounding of grains or tubers as food preparation are heavy tasks. Renewable energy can power machines that wash, cool, mill, grind, de-husk, press, sew, and cook efficiently thereby easing these burdens, increasing efficiency and quality of produce, improving well-being and freeing up time. Energy powered storage and handling (e.g. refrigeration, drying, smoking, pasteurization, fermentation, canning and packaging) reduce post-harvest food loss and improve food quality, increasing availability of nutritious foods at the household level (VFP 2019). Improved lighting and hygiene associated with clean energy and mechanized water collection can help reduce maternal mortality rates (UN Women 2014 cited in Smart Villages 2015). With access to lighting, they are less exposed to safety risks such as sexual and gender-based violence during the night (UNHCR 2015).

In the post-COVID context, appliance availability will have a bearing on women's ability to start home-based businesses that may be more important in the new normal. In homes, energy services will be required to power lighting in work and study areas, phone and internet access to maintain communications, including online home schooling and access to safety information during the pandemic (ENERGIA 2020). In some cases, appliances may also help transform gender relations through making men more willing to share household responsibilities and to take on household tasks such as cooking (ENERGIA 2019). However, in the long run, it is clear that such measures will need to be accompanied with those that challenge prevalent patriarchal norms and can bring about a transformational change in the subordinate position of women and the gender division of labour. Clearly, delivering sustainable energy will require a greater focus on gender equality.

It is estimated that if the unpaid work of women worldwide were assigned a monetary value, it would constitute between 10% and 39% of GDP (UNRISD 2010).

Climate change impacts women and children the hardest. At the same time, women play a critical role in response to climate change. Renewable energy can help mitigate many of these impacts.

Climate change affects women's and men's assets and well-being differently and often amplifies existing gender inequalities (UN Women 2018, Habtezion 2016 and 2013). Women have unequal access to land, water and other productive assets, issues further compounded by limited mobility and decision-making power in many contexts. Ownership of land, the most important economic asset, is skewed: women comprise 43% of the agricultural labour force in developing countries while they own only 18% of agricultural lands (FAO 2011). The increasing frequency and intensity of extreme weather events and natural disasters, including droughts, landslides, fires and floods, is on the rise. This too has a disproportionately negative impact on women and children, who are 14 times as likely as men to die during a disaster (UN Women 2018). In addition, women's burden of unpaid care work only increases in a changing and unstable climate context, furthering the cycle of gender inequality. Climate-induced scarcity increases the time and effort required to collect, process and store fuel and water, tasks for which women and girls are responsible (UN Women 2018 and 2016). Distributed renewables for energy access (DREA) technologies⁶ can help ease many of these time- and labour-consuming activities, thereby improving their health and well-being.

At the same time, women have the potential to play a critical role in responding to climate change, though this role is not utilized sufficiently at present. When men are forced to migrate in search of livelihoods, women are forced to start managing agricultural lands as *de facto* heads of households (ENERGIA 2019). They have sound knowledge of local resources and sustainable resource management practices at the household and community level. At the local level, they are often key actors in building community resilience and responding to climate related disasters. Women tend to make decisions about resource use and investments in the interest and welfare of their children, families, and communities (UNEP 2016; UNEP undated; UN Women 2015). As a result, when women participate and have a say in governance of energy and environmental processes, it results in greater responsiveness to the needs of the people.

⁶Distributed renewables for energy access (DREA) are renewable-based systems (stand-alone and off-grid systems as well as mini-grids) that generate and distribute energy independently of a centralized electricity grid. These technologies include small-scale electricity generation systems and mini-grids for lighting, battery charging, communications, water pumping and a variety of processing and other productive uses (REN 21 2019).

National policies and frameworks on climate change and energy incorporate limited commitments to DREA options and to gender equality.

Nationally Determined Contributions (NDCs) are a critical tool in advancing the UN Framework Convention on Climate Change's Paris Agreement. According to a 2019 analysis of the NDCs by IRENA, of the 156 NDCs submitted, only 132 Parties included renewable electricity targets in their NDCs. Interestingly, a higher number of countries (135) already have national, regional and/or sub-national renewable electricity targets in place (IRENA 2019d), indicating that the NDCs could in fact be more ambitious than what they are. With regards to specific commitment to off-grid renewable energy (RE), only about 25 refer to off-grid solutions. Further, despite the limited GHG reduction potential of off-grid RE, the majority of NDCs commit to RE as mitigation targets, and only four countries reflect off-grid RE solutions in the context of adaptation and increased resilience (Bleching 2019).

At the same time, the inclusion of gender within the NDCs is pivotal to holding countries accountable in translating their ambitions for gender equality in the context of climate change action. An analysis of the extent to which the NDCs address women's human rights conducted by the Women's Environment and Development Organization (WEDO) observed that in total, 64 out of 190 INDCs included a reference to gender. Of these, 27 mentioned gender in relation to adaptation, 12 in relation to mitigation, 9 in implementation of commitments and 5 in capacity building (WEDO 2016; UN Women 2016; UNDP 2016 cited



in Pearl-Martinez 2020). Moreover, only 15 acknowledged women as decision makers in the context of climate change policymaking. The most frequent way in which women were described was as a vulnerable group. This categorization emphasizes their needs; however their participation and leadership in accelerating climate actions get overlooked and thus unmeasured and unsupported. Another analysis of 192 national energy frameworks from 137 countries showed that only a third of the frameworks include gender considerations to some extent (Prebbles and Rojas 2017). Of those that do, women are mostly characterized as potential stakeholders or beneficiaries. Only two categorize women as agents of change, recognizing women's potential to unlock

more effective energy activities and to drive policy change. Energy frameworks also disregard women's economic potential and their role in the informal economy—which, in reality, is often an important source of employment for women in developing countries. Fourteen energy frameworks identify women's ministries and organizations (or equivalents) as implementing partners, tasked with specific activities.

Women are under-represented in leadership positions in politics, energy and climate actions.

Gender equality and women's empowerment require women's meaningful participation and equal opportunities for leadership at all levels. In many countries, legal barriers to gender equality have been removed to a large extent: women can vote and be elected; they have access to education; and they can increasingly participate in the economy without formal restrictions. But progress has been uneven as women move up from basic areas into enhanced ones (UNDP 2020): women tend to make greater and faster progress where their individual empowerment or social power is lower (basic capabilities). But at higher levels, they face a glass ceiling where they have greater responsibility, political leadership and social payoffs in markets, social life and politics (enhanced capabilities). In the Asia-Pacific region, the level of female political representation is low, and women are under-represented in parliaments compared to other world regions. In the majority of countries in the region, women continue to hold fewer than the 30% of seats which is considered significant to ensure meaningful change. Only 24% of parliamentary seats are held by women, and in 2019, women represented only 5% of heads of government (UNESCAP 2020a; UN Women 2019). The limited representation of women in political leadership is also reflected in their under-representation in planning, decision-making and implementation in climate change actions including those on renewable energy (Gendercc-Women for climate justice undated). A global survey of 65 countries

conducted in 2014 found that less than a third of the countries had appointed a gender focal point in the ministry of energy (IUCN 2015). Where focal points are appointed, they often lack specific expertise on the linkages between energy and gender, as well as resources and mechanisms for integration (IRENA 2019b).

A global survey conducted by IRENA in 2018 showed that women represent 32% of the fulltime employees of responding RE organizations. In comparison, the share of female full-time workforce in the oil and gas sector was 22%. However, a further disaggregation of the RE companies shows that 45% of administrative positions are held by women, while women represent only 28% of STEM (science, technology, engineering and mathematics) jobs and 35% in non-STEM technical jobs (IRENA 2019b). If administration roles are removed, the ratio drops to about a 20% participation rate for women. The recent Global Energy Talent Index (GETI) global survey reported much lower numbers, where women only represent 14% of the RE workforce (Airsift and Energy Jobline 2019). The most prominent barriers to participation include perception of gender roles, cultural and social norms, and prevailing hiring practices. Another obstacle with regard to women's inclusion is the limited awareness and acceptance of the imbalance within the energy sector.

Data on women in parliaments shows that on 1 May, 2020, in Asia and the Pacific, 20.3% and 19.6% of parliamentarians are women, respectively. This is five percentage points below the global average, and five percentage points lower than Sub Saharan Africa (Inter Parliamentary Union 2020).

The global strategy to clean cooking is not working, impacting women and children severely.

In 2018, 2.8 billion people worldwide did not have access to clean cooking fuels (IEA et al 2020), the health and environmental impacts of which are devastating. Exposure to smoke from cooking fuels contributes to 3.8 million premature deaths each year: more than malaria, HIV, and tuberculosis combined. Women and children represent 60% of all premature deaths attributed to household air pollution (WHO 2018; WHO 2016). The South East Asian and Western Pacific regions bear most of the burden with 1.5 million and 1.2 million deaths, respectively. Across the developing world, women and children dedicate an average of 1.4 hours a day collecting fuel. It is estimated that about 840 million people, or 13% of the global population, are engaged in the part-time collection of wood fuel for subsistence use; and almost 85% of this work is done by women and girls (IRENA 2019b). In rural Gujarat, India, women spend up to 40% of their waking time on collecting fuel or cooking (World LP Gas Association 2014). Another study undertaken in Bangladesh, India and Nepal reported that women in these countries spend up to 20 or more hours per week in energy collection (Practical Action 2015). The baseline survey conducted in Cambodia and Viet Nam under the EmPower project showed that women were spending approximately two hours per trip to collect fuelwood. In the current COVID-19 pandemic, this scenario can become worse. According to a survey conducted by the Clean Cooking Alliance, the current economic slowdown caused by the pandemic could cause a return to firewood and polluting biomass fuels,

creating health and environmental impacts for months or years (Clean Cooking Alliance 2020).

It is estimated that an annual investment of at least \$4.4 billion is needed to achieve universal access to clean cooking (IEA, 2018, cited in IEA et al 2019). However, investment alone will not ensure reaching the targets: increasing access to and the use of clean fuels and stoves has not been easy, and there are no “magic bullet” answers. Apart from investment, there are other obstacles including lack of policies, lack of awareness of the benefits of clean cooking options, and often also the lack of culturally acceptable solutions. In the region, neither quantifiable targets nor specific policies on clean cooking have been widely adopted, barring a few exceptions. Bangladesh, through its national Improved Cook Stove programme, has set a target to increase access to improved cook stoves, which it exceeded by 50%, distributing 1.6 million cook stoves as of mid-2019 (REN 21 2019). In India, the Ujjwala scheme has provided LPG connections to more than 80 million rural households since 2016 (Government of India 2020). The scheme, which originally targeted rural women – the segment of the population most affected by indoor air pollution and the drudgery of fuelwood collection – was extended to provide LPG access to all poor households, with the goal of covering 100% of the population.

Further, women play a particularly crucial role in the adoption of clean cooking solutions, yet they often struggle with

affordability. An often overlooked but essential part of a clean cooking program is its attention to behavioral patterns, cultural norms and regional variations. Unlike electrification, cooking practices are heavily dependent upon culture, cuisine, household dynamics, as well as the availability of socially acceptable and affordable fuels and technologies. There is no one-size-fits-all solution when it comes to clean cooking; each region has its own preferences and acceptability thresholds, which directly influence adoption rates (IEA et al 2019).



Women and renewable energy entrepreneurship: rationale

Why invest in women's entrepreneurship in renewable energy?

The way energy is delivered is changing, from vertically-centralized grids to DREA systems that combine on-grid and off-grid solutions. Between 2011 and 2016, the number of people benefiting from off-grid renewable energy solutions grew six-fold, reaching more than 133 million globally (IRENA 2019c). The number of people benefiting from standalone solar lighting and home systems has grown twelve-fold since 2010, exceeding 120 million by 2016 (IRENA 2019c). With large pockets of the population un-electrified in the Asia Pacific region, the market for decentralized energy access technologies – including solar lanterns, solar home systems, and micro- and mini-grids – is substantial. In 2018, the newly installed capacity of small-scale, off-grid solar systems (solar lanterns and solar home systems) in the region exceeded 20 MW. The largest DREA technology category sold in the Asia Pacific region in 2018 was portable solar lanterns, with the highest growth being in sales of lanterns with mobile charging capabilities (REN 21 2019). Some countries like Cambodia adopted integrated planning that combined grid and off-grid electrification, public financing, and incentives for the private sector, and its off-grid expansion proved significant in improving access in rural regions (IEA et al 2020).

Emerging as a disruptive force is the decrease in the cost of renewable technologies, which enables off-grid energy service companies offering household solar electricity systems that can support varying bundles of light-emitting diode (LED) lights, mobile phone chargers, radios, fans, and/or super-efficient televisions. Since 2009, solar PV module costs have fallen by more than 80% and the average cost for solar and wind electricity could further decrease by 59% by 2025 (IRENA 2018a; IRENA 2018b; IRENA 2016). This cost decrease has created a space for new, innovative business models for energy access, such as third-party ownership of solar panels and digitization of payment schemes. Mobile communication technology is further enhancing these possibilities via mobile banking and mobile payments. About 53% of the global un-electrified population is already covered by mobile networks (Nique and Smertnik 2015), driving demand for accessible, affordable power-charging facilities—such as ones supported by DREA systems. The success of these new business models relies heavily on strong distribution networks, where women have an opportunity to utilize their community networks, particularly in rural areas. It is estimated that over the period to 2030, new connections to the grid will bring electricity to over half of those that gain access. Grid connection will provide the most cost-effective means of access in urban areas, but decentralized systems are likely to be the most cost-effective solutions for over 70% of those who gain access in rural areas. By 2030, renewable energy sources are likely to power over 60% of new access, and off-grid and mini-grid systems provide the means for almost half of new access, underpinned by new business models using digital and mobile technologies (IEA 2017).



Photo: Asian Development Bank

- Reliable energy sources facilitate technologies such as water supply and purification systems, and information and communication systems adopted for community needs. This also includes those on early warning systems, which can increase adaptation and resilience through economic, social and environmental benefits (Perera et al 2015). In areas where there are severe disruptions to grid electricity or no access to reliable grid electricity, or where communities have to depend on expensive options to access these services, off-grid, small-scale, decentralized energy technologies can be used for providing access to these services (Blechinger et al 2019).
- In agrarian communities where women comprise the majority of responsibility for invisible and unpaid agricultural tasks and form the bulk of small holders, renewable energy can aid in practicing climate-smart agriculture. Reliable and clean energy for smallholder farmers can contribute to improving agricultural production through pumping water for irrigation, fish farming, livestock rearing, primary processing, or small-scale industries. Many of these activities require only small amounts of power (from 100W to 3kW) and yet it is scarce, and where available, it is expensive and polluting.
- In reducing the time and energy spent on laborious tasks such as agricultural activities, women can gain additional control over savings and time for new income generation. This could have a positive snowballing effect on health, safety, education and a community's ability to bounce back from unexpected climate shocks (Wallgren 2019).
- Besides providing electricity services for households, DREA solutions are increasingly supporting public services (e.g., education, water and primary health care) which benefit women and their families. DREA systems can help improve the reliability, operations and services of essential services like water and health, by, for example, securing medical cooling chains or supporting secondary electricity supply for hospitals during black-outs (Blechinger et al 2019).
- DREA solutions offer opportunities for women's engagement along the value chain (Pearl-Martinez 2020), including those in project planning, equipment manufacturing, construction, installation, facilities operations, maintenance and a broad range of support services, such as finance, information technology, human resources, administrative support, marketing, etc. (IRENA 2019b). An estimated 1.5 million full-time-equivalent jobs could be created in the off-grid solar value chain by 2022 (excluding manufacturing) (IRENA 2019c). Most are likely to be in installation and maintenance. Many of these skills can be developed locally and women are ideally placed to lead and support the delivery of energy solutions, especially in view of their role as primary energy users and their social networks.

By providing the above benefits, DREA systems can contribute to the achievement of multiple SDGs (see Figure 1).

The benefits of investing in women's renewable energy businesses

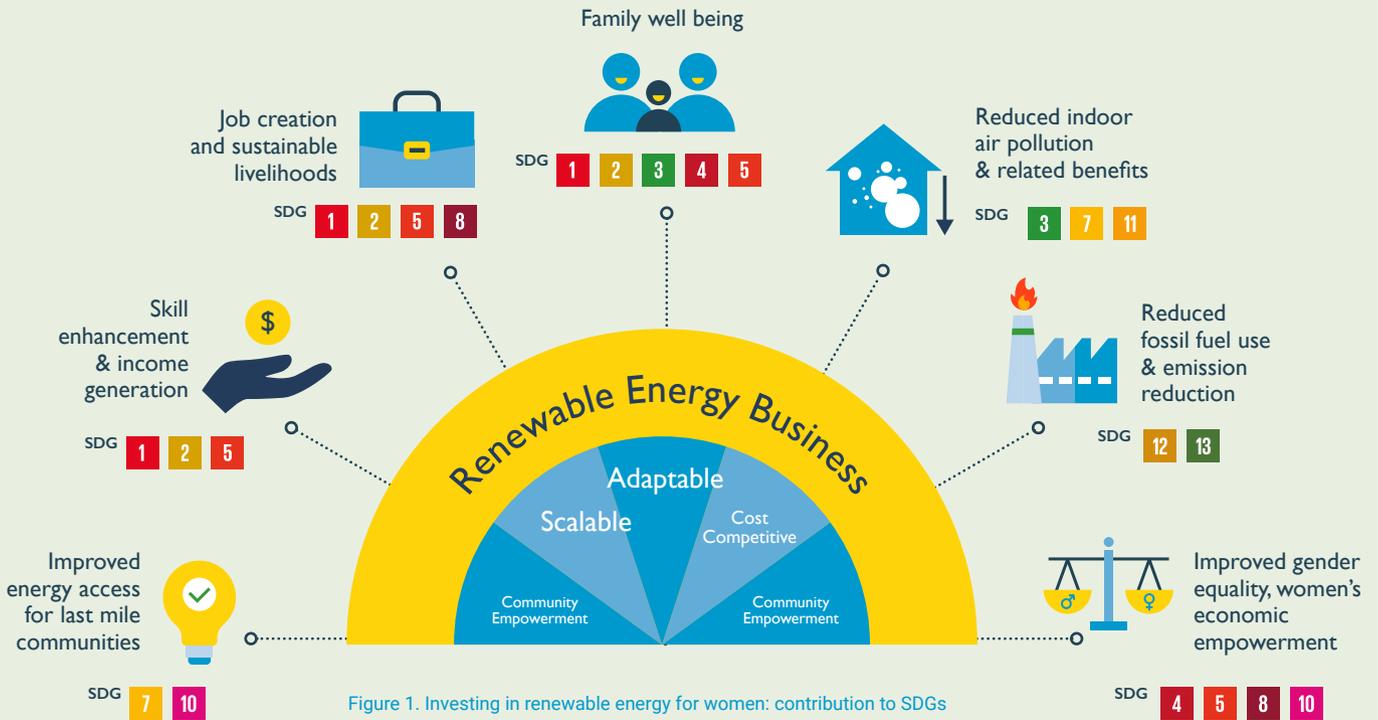
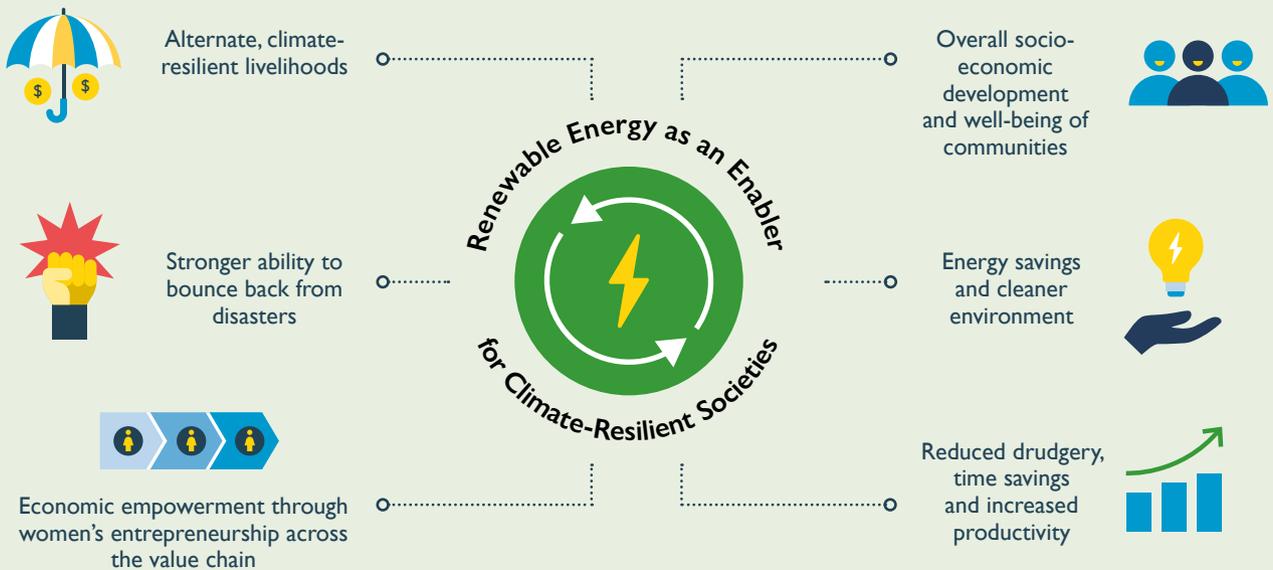


Figure 1. Investing in renewable energy for women: contribution to SDGs



Investing in women's entrepreneurship in renewable energy: macro level gains

Women's economic empowerment is a route to poverty reduction and investing in women's enterprises is a win-win solution for national governments.

Since women and children make up the majority of those living in poverty, energy initiatives that increase income-generating opportunities for women can be important factors in reducing hunger and poverty levels and can enhance women's social and political status, thereby promoting the empowerment of women and contributing to SDGs1 and 5. According to the International Labour Organization (ILO), women's work, both paid and unpaid, may be the single most important poverty-reducing factor in developing economies (IMF 2013; World Bank 2012). Even though 80% of those without energy access and those reliant on biomass for cooking have incomes of less than US\$ 3 per day, together they spend US\$ 37 billion per year on meeting basic energy needs (World Economic Forum 2013), thus representing a huge market potential. However, conventional private sector actors find it difficult to tap this potential as operating distribution channels to reach last mile markets remains a challenge: customers in remote areas do not shop through standard retail channels; local distribution chains are fragmented; and sales volumes are low. Women and their organizations are uniquely positioned to play a critical role in bridging this gap at the last mile, and through this, enhance their incomes and reduce poverty.

Investing in women's businesses and enterprises is good for national economies. Women's economic empowerment boosts productivity and

increases economic diversification and income equality, in addition to other positive development outcomes (IMF 2018). In Asia, entrepreneurs make a significant contribution to the GDP, even though it is not always recognized, as many micro- and small-scale enterprises are part of the informal economy. Viet Nam, for example, has a large percentage of women-owned businesses: 31.3% of Vietnamese businesses are owned by women according to a 2018 study by Mastercard (Mastercard 2018). An International Finance Corporation (IFC) 2017 report on 'Women-owned enterprises in Viet Nam: Perceptions and Potential,' showed that 57% of women-owned businesses in Viet Nam are microenterprises, 42% are small and medium enterprises (SMEs) and 1% are large enterprises. Recognizing the importance of SMEs, Viet Nam's central government is targeting to have one million enterprises by 2020, of which more than a third will be owned by women (Hasnen 2020). In 2017, the government also passed the SME Support Law, which includes a set of measures to expand access to finance and other business development services to SMEs. In total, micro, small, and medium-sized enterprises (MSMEs) account for more than 96% of all enterprises in Asia and the Pacific, contributing an average of 42% of total exports and providing employment for 62% of the labor force.

"Gender equality is a core development objective in its own right—and, also smart economics," highlights the World Development Report 2012: Gender Equality and Development (World Bank 2012)

Mckinsey estimates that advancing women's equality in the countries of Asia Pacific could add \$4.5 trillion to their collective annual GDP in 2025, a 12% increase over the business-as-usual trajectory (Mckinsey 2018).

Women as Change Agents Across the Energy Value Chain



An estimated **1.5 million**

full-time-equivalent jobs could be created in the off-grid solar value chain by 2022 (excluding manufacturing) (IRENA 2019).

Currently, according to a global survey by IRENA in 2018, that women represent only

32% of the fulltime employees

at responding renewable energy organizations.

45% of administrative positions are held by women,

while women represent only 28% of STEM (science, technology, engineering and mathematics) jobs and 35% in non-STEM technical jobs (IRENA 2019).



Women can be part of this value chain from project planning to equipment manufacturing and maintenance to administrative roles.



Critical players in sectors like agriculture and the informal economy, providing a ready springboard for selling energy products and services.

139-170 million



small and medium enterprises in developing economies in these sectors have one or more women owners.

As women entrepreneurs grow, they often take on leadership roles in their communities.



Women's business success translates into reinvestment in families and communities, as women entrepreneurs are more likely to spend earnings on children's education and health.

Women are important consumers and spokespersons for clean energy, influencing household energy decisions and discretionary spending.



Lower credit risks and greater likelihood of loan repayment among women entrepreneurs meaning greater return on investment.



Ability to reach customers in remote areas with fragmented supply chains, that do not shop through standard retail channels and untapped female markets.



Photo: Joser Dumbrique / UN Women

When a woman earns an income, it multiplies and benefits many people.

Women tend to make decisions about resource use and investments in the interest and welfare of their children, families, and communities (UNEP 2016; UN Women 2015). Women spend, save and invest money in profoundly different ways than men. One such difference is that when women have discretion over their financial choices, they prioritize spending on their families. Hence, the benefits of economically empowering women can reach far beyond the individual. On average, women spend 90 cents out of every US dollar earned on education, health care, and housing, in comparison to men who spend 60 cents on these items (Women's World Banking 2017). Women's business success 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; IMF 2013; Aguirre et al 2012).

- Women entrepreneurs take on leadership roles as they grow. As women entrepreneurs grow, they often take on leadership roles in their communities. Many become role models for other women in their communities and show that women like them can run successful businesses, and negotiate and advocate for their interests (Dutta 2019). Women as leaders can help transform social norms and culture while amplifying the voice of women in new and existing political spaces. One such example is Thida Khaev of Cambodia (see Box).

“Women are better at managing the budget and better at making key financial decisions that impact the family such as a child's education,” notes Mastercard's group head for Asia, Pacific and the Middle East and North Africa (Nethammer 2013).

“If you can empower women economically, you can ignite a catalyst for greater poverty alleviation at the individual, household and community level that is unstoppable” (Iskenderian 2011).

**BOX**

Thida Khaev: a solar entrepreneur from Cambodia

Across Asia and the Pacific, women are pioneering a renewable energy revolution in rural communities. Take for example, 38-year-old Thida Khaev, an entrepreneur who runs a company called “Solar Green Energy, Cambodia” or “SOGE” that helps rural households install, maintain and repair renewable energy products. Since establishing her enterprise, Thida and her employees have been instrumental in building community awareness of renewable energy and greater demand for renewables-based products such as lights, lamps, irrigation pumps, etc.

In 2003, in rural Cambodia, Thida Khaev noticed that running electricity every day and connecting to the grid was prohibitively expensive for many poor families like hers. She knew that there had to be an alternative to paying 4-8 US\$ per kilowatt. But it was a challenge to find such viable alternatives easily in the market. Furthermore, villagers remained unconvinced that something as simple as a solar lamp, running on sunlight, could power up their homes and shops. “They didn’t believe me when I said that the sun could help us make electricity,” she says. Thida, then an office manager in another enterprise that sold solar products, was inspired to set off on her own journey.

It has been 13 years since then and Thida’s enterprise is now thriving and transforming the lives of people by bringing much needed electricity to households for domestic and farm appliances. The road to get here hasn’t been easy. On the one hand, social norms in Cambodia constantly hold women back from accessing knowledge and new skills. “In Cambodia, they think women can’t do anything technical, but I disagree. Women can also do it and sometimes do it better,” Thida opines. On the other hand, accessing credit and finance for her enterprise was a challenge. “I had to take informal loans to

be able to manufacture and procure these products initially. Loan sharks would often charge me 6% interest every month in those days. Even when I sold my products to clients, I understood that many people in rural villages didn’t have the money to pay themselves. Hence, I decided to sell it to them on credit often at 20-30% of the cost upon purchase and the rest paid over many months. For the first six months, I didn’t make any profit,” she recalls.

Today, Thida employs nearly 25 people, many among whom women. All have been trained in administration, accounting, business, technical repair and manufacturing. Thida has now extended her work to the agricultural sector with renewable-based hydroponic farming and “smart farming”, bringing agricultural extension workers into the mix. She has started piloting other technologies, and is working with the IFAD/GEF project entitled “Building Adaptive Capacity for Scaling up Renewable Energy in Rural Cambodia (S-RET)” to test use of solar hydroponic systems. Along the way, she also established an organization called “Renewable Energy Development Association” in Kampong Thom. Through the years, Thida has risen through the ranks as an advocate for women and marginalized communities to benefit from renewables. Today, she leads the way for many other women to follow in her footsteps.

Investing in renewable energy contributes toward reducing greenhouse-gas emissions and thus impedes climate change.

The energy sector is responsible for the largest share of anthropogenic GHG emissions (UN Women 2016; Blechinger 2019). A 2017 IRENA and IEA study projected that increased deployment of renewable energy and energy efficiency technologies and methods can achieve a 70% reduction in global carbon dioxide (CO₂) emissions by 2050 (OECD/IEA and IRENA 2017). In 2019, the global energy-related CO₂ emissions had already flattened at around 33 gigatonnes (Gt). This resulted primarily from the expanding role of renewable sources (mainly wind and solar PV), switching from coal to natural gas, and higher nuclear power output (IEA 2019b).



Investing in women's entrepreneurship in renewable energy: a business case

Women, as energy managers in households, are central to purchase and spending decisions.

Women manage their households, and in that role, can play powerful roles in influencing energy purchase and use decisions in their homes. Division of roles and labour between women and men define what energy services each demands. Women remain the main providers of family and community care, and renewable energy can ease many of their related tasks, such as cooking, farming, water collection, sewing etc. At the same time, women can make specific contributions to greenhouse gas mitigation: they are often more willing than men to change their behavior in order to save energy and purchase low-carbon emitting products. At the same time, many women value lifestyle changes rather than changes based upon technological progress only.

Women are effective spokespeople for the use of clean energy, endorsing marketing messages, and taking advantage of women-to-women communication strategies. This is important since women hold significant sway in household decisions related to the purchase of energy technologies; even more so when it comes to cooking technologies (IFC, Lighting Africa 2011). They make or influence 80% of buying decisions and control US\$20 trillion in

global spending (Dalberg and ICRW 2014). It is projected that by 2028 women will control close to 75% of discretionary spending worldwide (Ernst & Young, 2012 cited in SEforALL 2017). Recognizing their role as consumers is important to expanding the market for renewables.

Women's existing businesses offer a great potential for growth of the energy sector.

Women's businesses and enterprises, especially through the informal sector, are already contributing significantly to the economy (IMF 2018; Schneider Electric 2017). In developing economies, there are 360–440 million formal and informal MSMEs (micro, small, and medium enterprise), 139–170 million of these (32–47% of total MSMEs) have one or more women owners. The majority of women-owned MSMEs (112–137 million) are in the informal sector (IFC 2013). The Global Entrepreneurship Monitor: Women's Entrepreneurship report for 2016-17 reported that in the 74 economies examined in the report, an estimated 163 million women were starting or running new businesses. In addition, an estimated 111 million were running established businesses (Kelley et al 2017). ADB estimates that the share of formal SMEs owned by women is 8%–9% in South Asia and 38%–47% in East Asia and

Central Asia (ADB 2013). In South Asia, over 60% of all working women remain employed in agriculture, concentrated in time- and labour-intensive, informal and poorly paid activities (CSW 2017). These provide a ready springboard for selling energy products and services. For businesses and private sector players in renewable energy, since women are shown to be a lower credit risk and repay loans more frequently than men, they may bring greater return on investment (Zelizer 2011). More generally and for all sectors, IFC's annual survey of its banking clients showed that the average NPL (non-performing loans) ratio for loans to women led SMEs was lower (3%) and better than the average NPL ratio (4.5%) for total SME portfolios for four consecutive years (2015-18), further strengthening the case for women entrepreneurs as viable business owners (IFC 2020a).



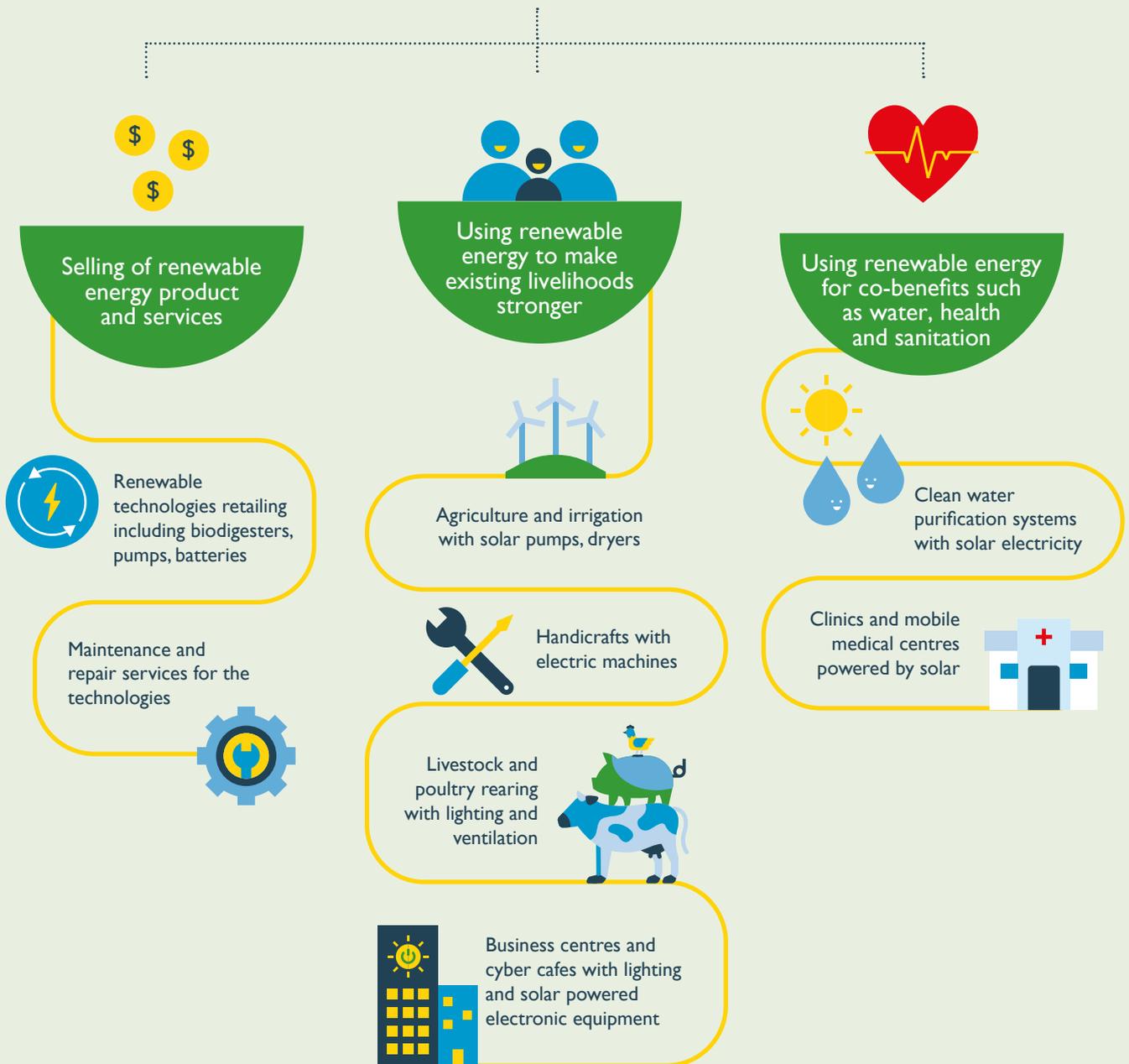
Photo: Abbie Traylor Smith / DFD

Women are uniquely positioned to reach difficult markets, including other women customers.

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, cited in SEforALL 2018) and there are examples of women outperforming men in selling energy products, including solar lanterns and cookstoves. Evidence from the Clean Cooking Alliance finds that women have unique societal and cultural understanding and can reach new consumer segments while also being able to better communicate to other women the benefits of cleaner cooking. Women, directly and through their networks, have access to markets (rural and slum locations) that are typically different from those of men.

In countries where gender disparity is high, women selling energy products as sales agents are able to access untapped female markets because women can buy directly from other women in the community and do not need to venture to cities or marketplaces. In the early 2000's, SELCO India's decision to train female solar technicians was guided by the fact that technicians needed to enter the homes of customers to repair solar lanterns and cookstoves. Since it was considered inappropriate for male technicians to enter the homes of customers while male family members were away, female technicians became the most practical solution (Baruah 2016). IFC-led Lighting Asia/India also built a market for off-grid lighting products in India by enabling the private sector to tap remote, rural markets by focusing on women as distributors and customers, and addressing barriers to growth by providing market intelligence, fostering business-to-business connections, strengthening last mile access and raising consumer awareness of quality-assured lighting products (IFC 2020b).

What are the different ways distributed renewable energy can work for women in communities?





Unpacking women's entrepreneurship programmes

Promoting women as entrepreneurs, especially in off-grid energy technologies, is gaining recognition as a strategy to bring energy services to un-served and underserved communities (ENERGIA, ESMAP and UN Women 2018). ENERGIA and several other partnerships, such as the WPower, the Clean Cooking Alliance and the Shine Campaign, are bringing together resources to engage women in distributed energy distribution at scale. At the same time, there is an international call to step up efforts to foster and value women's economic potential, acknowledged by the establishment of the High-Level Panel on Women's Economic Empowerment by the United Nations Secretary-General in 2016 (UNHLP 2017), and new global investment mechanisms such as the Calvert Foundation's Women Investing in Women Initiative and Goldman Sachs' 10,000 Women initiative. However, globally, while donors, governments, NGOs and private sector actors are stepping up action to support women entrepreneurs, specific activities to pair women's entrepreneurship and energy together remain too few.



Photo: Asian Development Bank

Barriers faced by women as entrepreneurs selling clean energy products and services

Women, as entrepreneurs, face numerous bottlenecks in selling and servicing energy products and in operating in low-income, rural areas. In developing countries, women dominate the informal sector, engaged in mostly unskilled work, with unstable earnings and no protection (UN, 2020b; Stoevska 2012; Campbell and Ahmed 2012; IMF 2013). Women in business have to overcome greater difficulties than their male peers, including limited education and business experience, lack of financing, discriminatory cultural and gender norms

and regulatory restrictions, isolation from business networks and competing demands of household responsibilities (Mastercard 2017; Kelley et al 2017; IMF 2013 and FAO, IFAD and ILO 2011).

Gender norms and traditional household roles often stifle women's economic potential.

In many economies, there are restrictions on women's mobility and participation in economic activities. Even when engaged in businesses, women continue doing most household work, spending twice as much time on household work as men and four times as much time on childcare. This is a primary reason they do not have as much time as their male counterparts to devote to their businesses (IMF 2013; UNDP 2020; United Nations 2020a; ADB 2018; Duflo 2012). In South Asia, for example, it is common for women to stop undertaking paid work upon marriage, while in many Pacific island countries, the social obligation to take on the financial commitments of the extended family weighs heavily on women, sometimes forcing them to exit the workforce (ADB and the Asia Foundation 2018). In many countries, male partners and older parents control whether women engage in paid work, rendering them financially dependent on their male partners and their partner's family. In fact, nearly one-third of both men and women in South Asia believe that it is unacceptable for women to have a paid job outside the home (ADB and the Asia Foundation 2018). These structural barriers translate into unequal access to productive resources such as land, finance, technology, labour, markets, justice and information and limit their potential.

Gender based violence and sexual harassment can curtail the ambitions of women entrepreneurs who fear for their physical safety. Women in South Asia report that abuse and harassment are among the top reasons for opting

out of the labor market. In addition, Cambodia, Indonesia, the Lao PDR, Malaysia, Myanmar, and Viet Nam all lack specific legislation on sexual harassment in the workplace, and thus indirectly affect national economies. It has been reported that women fear provoking the wrath of men by becoming involved in business activities, which may implicitly compromise a man's status (ADB and the Asia Foundation 2018). Gender-based violence has enormous psychological, social, and economic impacts that can hinder women's participation in business activities and the risk of violence impacts decisions made about the types of economic activities women engage in, how to use one's earnings, and how to balance work and home commitments.

In many countries, laws continue to discriminate against women. According to the 2018 Women, Business, and the Law Report, over 2.7 billion women globally face legal restrictions in regard to equal choice of occupation as men (IMF 2018), and this limits their economic potential. In 2017, 94 countries still had customary, traditional or religious practices that discriminate against women (UNEP undated). In 2018, 104 economies (out of the 189 economies assessed) were found to have laws preventing women from working in specific jobs and in 18 economies, husbands can legally prevent their wives from working (World Bank 2018). The effect of these discriminatory laws is compounded by restrictive social norms and gender-differentiated tasks.

Women have limited access to education, information, technology and skills. Compared to men, women in many developing countries have less access to education and are less likely

to have gained training or business skills needed for enterprises. Also, more educated women mainly choose salaried work, thus less-skilled women are relatively more likely to be entrepreneurs (ADB undated). Women's methods for using information and communication technology (ICT) to start businesses and to access new markets are not always adequate. Whether they are or not is clearly linked to each woman's confidence, education, skills, and networks (ADB 2018). In addition, in many countries, women face persistent barriers to entry and advancement in the science, technology, engineering and mathematics (STEM) careers, due to multiple reasons, including a lack of awareness of opportunities, lack of a STEM background, unfavourable workplace policies, perception of gender roles and self-perception, and so forth (IRENA 2019), which reduce the pool of professionally trained women in renewable energy.

An enabling environment for micro and small businesses is not always conducive. A study of SMEs in 25 countries supported by ADB during 2005–2017, also corroborated by the recently conducted baseline survey under the EmPower project, identified a weak enabling business environment (legislation, policies, regulations, and support institutions) as a key constraint to the development of the SME sector (ADB and the Asia Foundation, undated). Additionally, for women, underdeveloped rural infrastructure and services for transport, electricity, and clean water further limit access to resources, markets and public services such as healthcare, and lengthen the time needed for household, reproductive and care work (IMF 2013).



Women find it very difficult to source finance for their businesses.

Compared to men, women have less access to finance, mainly because of their low access to and control of productive assets. The Global Findex shows that 1.1 billion women do not have an account at a bank, while hundreds of millions more do not have access to a full set of financial products (Women's World Banking 2017). In Bangladesh and Pakistan, for example, 30% fewer women own bank accounts as compared to men (Global Findex database 2017)⁷. A number of barriers are responsible: millions of women lack documentation and other forms of identification to open a simple savings account; and they generally have fewer assets to pledge to a bank as women in many countries are legally barred from owning or inheriting land. The extensive documentation required to apply for a loan (often including a credit history) also disadvantages women, who are less likely to possess the required application documents or to understand them. For instance, in the ADB-supported Small and Medium-Sized Enterprise Development Project, in Bangladesh, 15% of the funds in every credit facility involved in the project was set aside for women borrowers. Although all the participating financial institutions had agreed to make these loans to women at a 10% interest rate, which was lower than the market rate, their commitment remained questionable. Many reasons contributed to this shortfall, including a lack of motivation on the part of the participating financial institutions, the difficulties that women had in understanding the documents and procedures; and the women's limited knowledge of business planning and development, which resulted in poorly done loan applications (ADB and the Asia Foundation 2018). Financial literacy rates are lower among women than among men in all of the ASEAN countries,

⁷The Global Findex database is a comprehensive global dataset on how adults save, borrow, make payments and manage risk. Launched in 2011, the database is published every three years (<https://globalfindex.worldbank.org/>).

particularly in the Lao PDR, Myanmar, and Viet Nam. South Asian countries have among the lowest financial literacy rates in the world (ibid). Around 5.3 to 6.6 million women-owned SMEs in developing economies, which amount to 63 to 69 % of women-owned SMEs, are estimated to be un-served or under-served by financial institutions (IFC 2013; IFC 2012). In the ASEAN countries, women-owned MSMEs with adequate access to financing averaged only 5%–6% of microenterprises, 12%–15% of small firms, and 17%–21% of medium-sized enterprises (ADB 2018). With little access to formal finance, SME entrepreneurs tend to rely on their earnings and on community and family support. In Cambodia and Viet Nam, in 2011, as few as 0.3% and 3.2% of women used an account at a financial institution for business purposes in, relying more on cash transactions (UNESCAP 2017).

Limited and unequal access to the internet and mobile devices among women is a concern. In an increasingly connected world, women are being left behind. Across low- and middle-income countries women are 8% less likely than men to own a mobile phone, 20 % less likely to use mobile internet, and 33% less likely to use mobile money (GSMA 2020). This, combined with lower financial and digital literacy prevents them from fully utilizing digital financial services. South Asia has the biggest gender disparity in mobile phone access (with a 38% gap); while East Asia comes close to gender parity in mobile phone access (ADB and the Asia Foundation 2018). Most of the 3.9 billion people who are offline are comprised of those who live in rural areas, are poorer, less educated and tend to be women and girls (CSW 2017).

When working on RE businesses, women face additional constraints.

In many societies, women face attitudinal obstacles in their starting a renewable energy business. In some countries, gender stereotypes in the labour market reinforce the conception that modern energy technology businesses are “men’s work”, while women are expected to operate more traditional, and less profitable, biomass-based micro-enterprises (Danielsen 2012). For women entrepreneurs selling renewable energy products, additional constraints include a low level of consumer awareness for renewable energy products, translating into low market demand; limited product service (repair, maintenance) near home and non-availability of accessories (to replace damaged ones), further hampering the markets that women can reach, with their mobility constraints (Dutta 2019). Further, with COVID-19, many entrepreneurs as well as their customers cannot go to markets, and often cannot access raw materials or products. As a consequence, it may be difficult to repay business loans, profits are lower and may be diverted to family emergencies rather than be re-invested, and businesses are closing (ENERGIA 2020).

An overview of business models and strategies

Globally, a number of partnerships and networks, such as ENERGIA, WPower, and the Clean Cooking Alliance have been promoting women's entrepreneurship in different regions with a variety of approaches. Networks such as the Clean Energy, Education and Empowerment Initiative (C3E), Women of Renewable Industries and Sustainable Energy (WRISE), Women in Solar Energy (WISE), Entrepreneurial Women in Renewable Energy (EWIRE) and the Global Women's Network for the Energy Transition (GWNET) are also spreading ideas, mobilizing support and providing encouragement to build a cadre of women leaders in the energy sector (ENERGIA, ESMAP and UN Women 2018).

Within the Asia-Pacific region, several initiatives have been introduced. Some of the key regional programmes include:

- **The “EmPower: Women for Climate-Resilient Societies”** project, which is being implemented by the UN Environment Programme (UNEP) and UN Women. In addition to regional and national level advocacy and policy influencing, the programme supports women in Bangladesh, Viet Nam and Cambodia in using renewable energy technologies to run enterprises that can improve their existing incomes as well as sell renewable energy products.
- **The APEC Initiative on Empowering Women as Managers of the Renewable Energy Sector** works with women in renewable energy careers across the region (APEC 2019).
- **The Women Enterprise Impact Investment Fund** was launched by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) in late 2019. The Fund seeks to provide funding and technical assistance support for the establishment of a women enterprise impact investing fund in the region (UNESCAP 2020b). This fund is not specific to energy.
- **IFC's Lighting Asia/India Program**, has been supporting the private sector to develop and sale up gender smart business solutions by focusing on women as distributors and customers of quality assured off-grid lighting products and home systems.
- **The Women Entrepreneurs Finance Initiative (We-fi)**, which aims to promote female entrepreneurship by ensuring that more women-led businesses have access to finance, training and mentorship opportunities. The initiative provided USD 20.2 million for an Asian Development Bank (ADB) project in Viet Nam and the Pacific in 2019 and funded a USD 12.6 million ADB project in Sri Lanka in 2018.



Photo: Asian Development Bank

Voices of women's enterprises in renewable energy value chains in last-mile communities in Africa regarding COVID-19 impacts, April 2020 (ENERGIA 2020)

ENERGIA partners carried out an initial rapid assessment of COVID-19 impacts on 111 women entrepreneurs in Kenya, Nepal, Nigeria, Senegal, and Tanzania, in April 2020. These entrepreneurs are involved in solar technologies, including solar fridges and water pumping, improved cookstoves, productive uses of energy, and biomass and briquettes. Nearly 90% were 'somewhat' to 'very worried' about COVID-19. Financial stress was the most dominant concern: How to pay bills and buy food? Revenue and customers have been declining in the previous two months, due to lockdowns, market closures, and reduced mobility. Their customers also faced reduced income levels and were prioritizing food. None of the women entrepreneurs were aware of any relief packages for businesses, and 80% had not seen any support at all in their communities. The others had received either masks from private organizations, or food via their local governments or churches. Women entrepreneurs with a smartphone were able to contact some customers and post products via WhatsApp, and they could also get pictures from flyers via their program mentors. But only a third of the women entrepreneurs had both a smartphone, and the ability to charge it all the time.



At the country level, the Cambodian improved cookstoves programme has been effectively utilizing women's traditional skills in pottery to produce and disseminate over 450,000 improved cookstoves. In India, the NGO Swayam ShikshanPrayog (SSP) helps rural women market renewable and solar energy products in their communities. SEWA, the Self-Employed Women's Association, a women's trade union, has been disseminating clean cook stoves and solar lights to its members in India. India also has the Lighting a Billion Lives initiative (featuring solar micro grids; solar lanterns; solar home lighting systems; and cookstoves) which provides opportunities for women's employment in sales, rentals, and repair of solar lanterns, led by TERI (Baruah 2016). In Indonesia, the Wonder Women programme, an initiative of Kopernik Solutions, the non-governmental organization, has been working with women to expand last-mile energy access through off-grid renewable energy technologies. In Nepal, the Centre for Rural technology

and Practical Action has been working with women entrepreneurs as well, under a technical assistance project funded by the ADB. Women are playing an equally important role in the Indonesian Domestic Biogas Programme or Biogas Rumah (BIRU). Under the programme, over 1,000 digesters have been deployed, and nearly a third of the bio-slurry operations are managed by women (IRENA 2018a).

Programmes promoting women entrepreneurs usually adopt a combination of a number of interventions, which together address the challenges discussed in the previous section: a) business development services, which include business training, business advice or mentoring, business incubation and formalization services; b) improving market linkages; c) access to finance; d) efforts to enhance women's agency and empowerment⁸, which are targeted to bringing about a positive transformation in gender relations; and e) creating favorable business enabling environments.

⁸The empowerment of women and girls concerns their gaining power and control over their own lives. To be empowered, women must not only have equal capabilities (such as education and health) and equal access to resources and opportunities (such as land and employment), but they also have the agency to use these rights, capabilities, resources and opportunities to make strategic choices and decisions (source: Un Women, Gender Equality Glossary. <https://trainingcentre.unwomen.org/mod/glossary/view.php>)

Women's Energy Entrepreneurship: Intervention Package

Enterprise development Strategies



Outcomes



Systemic constraints limiting economic opportunities for women: Adverse social norms, unpaid household and care work, discriminatory laws and gaps in legal protection, gender gaps in access to digital, financial and property assets



Case studies

Coordinated, multi-partner programming: ENERGIA's WEE programme

Since 2014, ENERGIA, the international network on gender and sustainable energy, has been implementing the Women's Economic Empowerment (WEE) programme. Partner organizations include the Centre for Rural Technology Nepal (CRT/N), Energy 4 Impact, Kopernik Solutions (Kopernik), Practical Action Eastern Africa and Solar Sister. From 2014-2018, 4,153 women entrepreneurs working in renewable energy businesses and in productive use of energy were supported in seven countries (Indonesia, Kenya, Nepal, Nigeria, Senegal, Tanzania and Uganda). These entrepreneurs have created 6,000 jobs for other women and young people and have sold renewable energy products (such as fuel-efficient cookstoves, solar lanterns, solar home systems and biomass briquettes) to over 3 million people. Key features of the WEE programme are:

- The organizations implementing the WEE programme provided an integrated support package including training in technical and business aspects of energy businesses, as well as on leadership, empowerment and agency; skills that transcend beyond their energy businesses.
- The programme design was centred around the belief that because the factors limiting women's entrepreneurship are manifold and intertwined, integrated measures are needed to realize women entrepreneurs' potential.
- The entrepreneurs are provided customized support from mentors trained by the organizations. Mentors visit the entrepreneurs on a regular basis, and advise them to identify new market opportunities, link with markets, transact with suppliers and government authorities, prepare business plans, and negotiate with financial institutions.
- The project also supports partner organizations to strengthen product supply chains by linking with international quality suppliers of energy products, and links entrepreneurs to financing institutions and with the local government.
- The WEE programme is closely linked with the ENERGIA advocacy programme, which has contributed to gender integration in national energy policies and has reached 23 million people through awareness campaigns in many of these countries, as essential enabling elements to support the development of female energy businesses.

Connecting locally embedded entrepreneurs with technology suppliers: IFC Lighting Asia/ India

IFC's Lighting Asia/India IFC program aims to increase access to clean, affordable energy in rural India by promoting modern off-grid lighting products and systems. The programme works with the private sector to remove market entry barriers, provide market intelligence, foster B2B linkages and raise consumer awareness on modern lighting options. It is currently operational in the states of Bihar, Uttar Pradesh, Rajasthan, Odisha and Assam in India. Recognizing the need for creative approaches to persuade customers to adopt solar lighting in rural India, it partners with private sector companies to identify and train women entrepreneurs for better impact, and to create awareness about alternative and clean sources of lighting in their areas of operation.

For private sector manufacturers, working with a network of female entrepreneurs facilitates sales in a market segment that male agents might not have been able to access. Through the networks, distributors have been able to overcome cost and market barriers in last-mile communities and increase sales of solar lighting products by approximately 30% (IFC 2017b). The programme helps build distribution networks, increase customer trust and market access, and enhance public awareness and recognition (IFC 2017b).

One of the partners of the program is Frontier Markets, that works through women entrepreneurs known as 'Solar Sahelis', a group of self-employed women recruited from self-help groups. So far, over 3000 rural women entrepreneurs have been trained, who have sold over 1 million units of products (Frontier Markets undated).

- Solar Sahelis raise awareness of the benefits of high-quality solar lights through the Suryoday™, or "Sunrise" campaign, which highlights economic savings and health benefits of solar lighting.
- Buying solar products is a longer-term, one-off financial investment, making it impractical to maintain full-time, dedicated sales staff in remote communities. By working through independently employed women, Lighting Asia/India and Frontier Markets gained a flexible network that was also deeply tied to local communities. At the same time, Solar Sahelis earn an average of \$35 per month for part-time work, a substantial addition to what was typically a low or nonexistent income.
- While high-quality solar lighting delivers cost savings in comparison to fuel-based lighting over time, in the short term, it can be a substantial investment for rural customers. Having a network of Solar Sahelis embedded in local communities and available to answer post-sales inquiries built the trust needed to purchase off-grid solar lighting.

Another partner, Dharma Life, is a social enterprise that works with a network of 16,000+ Dharma Life Entrepreneurs (DLEs) in 13 states, more than 75% of who are women. The DLEs have reached more than 10 million beneficiaries in 40,000 villages. The DLEs sell and distribute products with social impact including quality solar lanterns and home systems, modern cook stoves, water purifiers, sewing machines, sanitary napkins, nutritional supplements, and services such as digital literacy and behavior change campaigns. Dharma Life has extensive partnerships with more than 15 leading companies and brands including Unilever, P&G, Coca-Cola, and Samsung (IFC 2020b).

- A DLE is a rural woman who understands the key problems of her community and wants to build her own business and generate an income. She is supported by Channel Development Officers and is trained in data collection including use of smart phones and internet, community mobilization and sales promotion, using IFC certified programmes.
- Based on a systematic needs assessment, Dharma Life, with support from IFC, designed a customized entrepreneurship training solution, which focuses on overall personality development of the entrepreneurs, and includes modules related to marketing; sales; financial management; business planning; tracking and MIS and behavioral and soft skills.
- Dharma Life also provides financing solutions for consumers either directly or with partners such as Microfinance institutions to improve affordability
- A digital tracking platform "DLTrac" captures real-time data and enables real time monitoring and evaluation of marketing, behaviour change and research activities in the field.



Photo: Saikat Mojumder / UN Women



EmPower project

The EmPower: Women for Climate-Resilient Societies, a regional project, being implemented across Asia and the Pacific, with national footprints in Bangladesh, Cambodia and Viet Nam. Working with key ministries and women's CSOs, EmPower promotes coalition building, collaborative research and targeted capacity building of CSOs in strengthening gender equality in climate change action, through influencing policy, delivering trainings and improving access to finance for female entrepreneurs to use renewable energy for livelihoods. Leadership and participation of CSOs in climate decision making processes will be fostered by bringing together CSOs with key Ministries for consultations and peer learning, and leveraging gender mainstreaming action groups in key ministries.

EmPower's work focuses on five key pillars:

- Voice and Leadership: Encourage civil society, women and marginalized groups to participate in climate and disaster decision-making
- Data for Decision making: Generate, analyse and use sex, age, and diversity disaggregated data to inform policy.
- Inclusive Policies: Improve gender responsiveness of climate, DRR and energy policies
- Renewable Energy for Women's Resilient Livelihoods: Enable women to use renewable energy as economic resources for resilient livelihoods
- Regional Knowledge Sharing: Stronger regional policies and processes and greater knowledge on gender equality and human rights in climate change and disaster risk reduction

EmPower project Pillar 4 on Renewable energy: Strands of work



Enabling environment: Policy and planning

- Developing national approach papers focused on integrating gender into renewable energy policies and programmes.
- Developing provincial action plans with partners to define strategies and actions to promote women's entrepreneurship and renewable energy-based livelihoods



Business development services: Capacity and knowledge enhancement

- Continuous training and mentorship on business skills, financial literacy, operation and maintenance of renewables-based enterprises. Incubation of enterprises, synergies with long-standing capacity building programmes and partnerships. Fostering regional knowledge and South-South learning



Access to finance

- Supporting women entrepreneurs to access existing public and private funds and loans.
- Leveraging partnerships with government institutions to finance enterprises.
- Channeling co-funding based on requirement, targeting current and future women entrepreneurs



Market linkages

- Identifying needs through detailed feasibility studies, leveraging partnerships with public and private institutions to support women entrepreneurs to access existing and new markets

In Bangladesh, Cambodia and Viet Nam, the project supported women to use renewable energy technologies to run enterprises that can improve their incomes as well as sell renewable energy products to others. EmPower is supporting 300 women entrepreneurs directly and nearly 1000 women indirectly in installation, maintenance and repair to distribution, billings and collection, across the following value chains:

- Renewable energy to improve productivity in existing livelihoods value chains (for example, by powering water pumps to improve agriculture and horticulture in drought prone areas, solar energy for crop drying, agro-processing, handicraft making etc)

- Sale and servicing of RE technologies like solar lanterns, solar home system, solar power packs, cookers, dryers, water heaters, bio-digesters, improved cookstoves for efficient cooking
- Renewable energy for associated benefits (lighting systems, clean cookstoves, refrigeration and cooling, drinking water systems, healthcare applications)

In Viet Nam, the programme is working with women led cooperatives in Bac Kan and Lao Cai provinces, two of the poorest provinces in the country. Lao Cai has 1,576 enterprises operating in agriculture, construction, transportation, mining and services, of which 20 % are led by women, and Bac Kan has 167 cooperatives of which about 18% are women centric. EmPower is

working with some of these cooperatives, supporting them to use renewable energy to increase their productivity and income generation, saving time and drudgery. EmPower is also working collaboration with the Vietnamese government programme "Supporting women in starting a business for the period of 2017-2025" and the Viet Nam Women's Union, to support women businesses to adopt renewable energy-based solutions.



Solar based irrigation in Bangladesh: IDCOL

The Infrastructure Development Company Limited (IDCOL) of the Government of Bangladesh is a non-bank financial institution that works on bridging the financing gap for developing medium to large-scale infrastructure and renewable energy projects in Bangladesh. Through startup subsidies, concessionary credit, and capacity development support, IDCOL complements the Government's mission of generating 5% of the country's total electricity from renewable sources by 2015 and 10 % of the total electricity from renewable energy by 2021.

One of the areas in which IDCOL has been active is solar based irrigation systems. In the largely agricultural-based economy of Bangladesh, solar based irrigation systems in rural, off-grid areas are an appropriate and environment friendly solution, reducing dependency on fossil fuels and the demand for electricity from national grid. IDCOL supports a number of organizations, known as sponsors, to install community based solar irrigation pumps. Each pump

serves 30-40 farmers with adjacent plots, who pay a fixed fee per irrigation season to the sponsor. After installation, the sponsors can apply for credit and grant financing from IDCOL. IDCOL provides up to 50% of the project cost as grant financing and 35% as credit support – the remaining 15% is covered by equity. A combination of private grants, credit and equity borne by the social enterprise and supported by IDCOL makes solar-powered technologies affordable to low-income farming communities. All costs and maintenance are the responsibility of the sponsor.

IDCOL has now set a target of installing 50,000 solar irrigation pumps by 2025. In 2019, IDCOL approved 1,630 solar irrigation pumps of which 1,323 are already in operation with a cumulative capacity of about 32 MWp. The World Bank, KfW, GPOBA, JICA, USAID, ADB and BCCRF are supporting this initiative (IDCOL 2014).

Solar Gaon works with IDCOL on its solar irrigation pumps project. In and around each solar pump, Solar Gaon engages local women in its activities, such as vegetable cultivation, handicrafts etc. Power generated by the solar pump serves various other needs of the community, like water purification, cold storage for mushrooms and brick making and powering small combine-harvesters that women can operate. In a creative turn, farmers use the shady spaces behind the large solar panels to keep poultry farms. When night falls, solar lights powered by excess energy are helping women run classes in sheds to improve their literacy (UNEP 2018).



Building a cadre of women solar engineers through technology demystification: Barefoot college, India

Barefoot College is an Indian NGO that has been providing basic services and training to bring sustainable solutions to rural communities for over 40 years. With a geographic focus on the least developed countries, it trains middle-aged women from villages worldwide to become solar engineers. In partnership with local and national organizations, the Barefoot team establishes relationships with village elders who help identify trainees, who are usually illiterate or semi-literate grandmothers who maintain strong roots in their villages and play a major role bringing sustainable electricity to remote, inaccessible villages.

- The women receive hands-on training for a period of six months at the end of which they are conversant with the complicated engineering process of making simple solar products. The curriculum has been designed to be taught and learned without the use of written or even a common, language.
- Alongside the technical aspects, the training includes a curriculum called ENRICHE, which teaches digital and financial literacy, basic human and legal rights, women's health, wellness and nutrition, sustainable living practices, micro-enterprise skills, and livelihoods.
- When the course is finished, the women go back to their villages with equipment for 120 solar lanterns where they help install solar lamp kits. Back home, each household contributes to maintenance and upgrading of the solar installation, an amount they previously spent on kerosene, candles or batteries. The women solar engineers are paid a monthly salary for repairing the solar lamps or kits; a committee headed by four women and three men from the village remains in charge of the equipment.

In the last decade, over 2,500 women solar engineers have reached over 1 million people in 1,300 villages worldwide in Latin America, Africa, the Middle East, Asia and the South Pacific islands, bringing domestic lighting to over 45,000 houses.

Reaching renewable energy to the last mile: Kopernik's Wonder Women, Indonesia

About a third of Indonesians, roughly 80 million people, live without electricity and many more face an unreliable supply. In the country's archipelagos, Kopernik runs its Wonder Women programme, or *Ibu Inspirasi* in Indonesian, which literally means inspirational woman. The programme supports the *Ibu Inspirasi* to work as technology agents who sell solar lanterns, water filters and fuel-efficient cookstoves in their communities (Dutta 2019, IRENA 2018c).

- The women are mostly from remote communities, where customers can buy the technologies from a trusted source and receive reliable after-sales service. The women themselves use the technologies that they sell, so they can speak knowledgeably about how to use the products and the many benefits they bring. Sales are made from home, through their networks, at market stalls and small shops, or at community events.
- The entrepreneurs receive training covering technology use and maintenance, sales and marketing, bookkeeping and financial management and public speaking, all to help them build and sustain their energy businesses.
- In introducing new technologies, Kopernik also works through local organizations that have existing networks in the local area and work closely with them. Such entities range from community-based organizations, cooperatives, savings and loans groups, schools, churches, to even mom-and-pop shops.
- Through an online marketplace, Kopernik connects donors, makers of innovative technologies (such as water filters and solar lanterns), and people in underserved communities who can benefit from those products.

Wonder women often become a pillar of support and inspiration for other women in the village, encouraging them to join the programme or support other economic activities. Since 2013, the programme has recruited more than 500 "wonder women", who have sold more than 55 000 clean energy technologies reaching more than 250 000 people in some of Indonesia's poorest and most remote areas, thereby forming a crucial link in the supply chain connecting carbon-friendly technology with the people who need it the most (Dutta 2019; IRENA 2019b).



Photo: Asian Development Bank



Photo: Samir Jung Thapa / UN Women

Mobilizing local finance for women entrepreneurs: WEE Nepal

Centre for Rural Technology Nepal (CRT/N) implemented the WEE Nepal programme, under the umbrella of ENERGIA's WEE programme. In 2014, when WEE-Nepal started supporting entrepreneurs on productive uses of energy, access to finance was the biggest challenge for the entrepreneurs. It was soon discovered that many of the women were in fact linked with the local financing institutions, as saving and credit members, but were not familiar with the procedural requirements for loans for energy businesses and were hesitant to approach them. The financial institutions, on their side, did not have the confidence to extend loans to them. A two-pronged strategy was put in place to help women facilitate finance from local institutions: First, the entrepreneurs' businesses had to be strengthened to a level that the financial institutions would feel confident about lending to the women. At the same time, the local financing institutions (LFIs) had to be sensitized and assisted to design women-friendly loan products (Dutta 2019).

A critical element of the strategy to access finance had to be building the trust of LFIs in the entrepreneurs. For this, the WEE-Nepal project sought the support of the Community Rural Electrification Entities (CREEs), community-based organizations that purchase electricity in bulk from the grid and retail it to its users within their area. The CREEs were asked to recommend entrepreneurs to the LFI. Since the CREEs would recommend only those entrepreneurs who they felt confident about, CREE-promoted entrepreneurs were seen as trustworthy clients by the LFIs. In many cases, the CREEs were also able to negotiate some concessions for the entrepreneurs, for example a discount on service charges and lower interest rates. At times, the CREEs even provided a guarantee to the LFIs so that they could provide concessional loans to CREE-supported women entrepreneurs.

By 2017, 227 entrepreneurs have obtained loans worth EUR 223,056 through 35 different LFIs in Nepal. At the time of the external evaluation of the project in 2018, all 227 entrepreneurs were on track with the repayments. The LFIs reported a high level of satisfaction since there were no defaults on loan repayments (Dutta 2019).

Building on rural women's traditional skills: Cambodia Improved cookstoves programme

In Cambodia, about 67% of the households used firewood for cooking, 24% used LPG and 7% used charcoal in 2018 (National Institute of Statistics, Ministry of Planning 2018). Women traditionally shoulder the burdens of collecting wood and cooking, spending an average of three to four hours a day on energy-related activities such as gathering fuel wood, boiling water and cooking. In 1997, Group Energies Renouvelables, Environnement et Solidarité (GERES), a French NGO, started disseminating improved cookstoves in Cambodia, and by 2014 GERES had distributed more than 3 million of them.

- In order to meet the specific needs of different types of households, GERES developed various improved cookstove technologies suitable for different (rural, urban) markets. The production of the two cookstoves differs widely. Although both emphasize women's involvement, the New Lao Stove (NLS) is mass-produced in a factory, while the NeangKongrey Stove, or NKS, is produced by women potters in their homes (Hart and Smith 2013).
- The rural NKS program has effectively utilized women's traditional skills in pottery while training the local women in quality control and enterprise development. Since the NKS production facilities are mostly home based, it permits women to have a flexible work schedule so they can complete their household responsibilities while also producing cookstoves. Most women also use the NKS in their own homes.
- Once trained and certified, the trained producers become part of a collaborative enterprise called the Association of Producers and Distributors of Improved Cookstoves in Cambodia (ICOPRODAC) made up of approximately 250 members. ICOPRODAC's meetings allow for collaboration between the cookstove producers and include exchange on challenges, distribution methods and ideas, and access to markets and retail connections. The women sell the cookstoves to retailers connected with GERES through the production facility or directly.
- In order to assure the quality of production, GERES created a model production facility in an area which had many potters interested in NKS production. The facility, which doubles as a training centre, also develops and tests technologies and production techniques, and develops quality controls for production. Women are trained in production techniques, proper documentation, production management, bookkeeping, finance, understanding technical drawings, national monitoring standards, and how to use templates and molds.

Tiered accountability and vertically integrated supply chain: Sakhi Unique Rural Enterprise, India

Sakhi Unique Rural Enterprise (SURE) was founded in 2009 by Swayam Shikshan Prayog (SSP), a non-profit in India. SURE engages rural women in the supply chain to bring clean energy products— such as improved cookstoves, water purifiers and solar products — to last mile consumers. The rural women entrepreneurs are called *Sakhis*, meaning “friend” in Hindi. Across various sectors, the work of SSP has reached 145,000 women across 6 states, and set up 97,000 micro-enterprises that are catering to clean energy and basic health services (Bhandari 2019).

- The Sakhis conduct door-to-door sales and earn a commission-based income. Most work part time as they have to prioritize household responsibilities and agriculture work. All Sakhis receive 10 days of training which is conducted over a three-month period.
- SURE also conducts community activities, such as energy needs assessments, which make the communities aware about inefficiencies in cooking and the impacts of fuelwood use. In case of improved cookstoves, potential customers are offered an eight-day product trial period which the Sakhis arrange and oversee so customers can test if the product is a good fit for them.
- The Sakhis order products using their mobile phones, which each entrepreneur is required to have. SURE receives the order and buys the product from the manufacturer, and ships it to the Sakhi's home. More expensive products, such as the solar water heater, can be ordered through the Sakhi for which she receives a small commission, but are installed directly by the company.
- SURE emphasizes customer service and works closely with the women entrepreneurs to provide quality after-sales service. Following training, the Sakhis are required to complete a repair and maintenance training programme in which they learn about basic repairs; warranties and offering replacement of products; and customer service. Sakhis do all minor repairs for free, while the major repairs are done by service engineers.
- In order to bring about accountability, SURE has created a cadre of 'Women Supervisors' each of who oversee 25 Sakhis supporting them in sales and confidence building. The women supervisors earn between \$60 and \$100 per month. Each month the supervisor and her group meet to share experiences and discuss particular challenges and practical solutions.

Lessons from women's entrepreneurship programmes

As can be seen from the above experiences, a range of strategies have been adopted by different organizations, depending on the local context, the communities and their own capabilities. The following table captures the case studies and demonstrates where current efforts have been made to promote women led enterprises in the energy sector.

Strategies to promote women led enterprises in the energy sector

| Intervention area | Specific strategies | Organization(s) |
|--------------------------------------|--|---|
| Business development services | Technology, business and leadership training, followed by one-to-one mentoring | ENERGIA, IFC, Kopernik, SURE, Barefoot College, EmPower |
| | Gender responsive training approaches | ENERGIA, IFC, Barefoot College, Sumba biogas programme |
| | Building on women's existing skills through new production and QA techniques | Cambodia ICS programme |
| Access to finance | Women's self help groups | ENERGIA, WEE Nepal |
| | Supplier credit and loan guarantee funds | ENERGIA, WEE Nepal |
| | Local financing institutions, cooperatives | IFC, WEE Nepal, EmPower |
| Market Linkages | Market assessment | ENERGIA, IFC, SURE, EmPower |
| | Sale of high-quality, branded products | ENERGIA, Kopernik, IFC, SURE |
| | Trust based selling and after sale servicing | All |
| | Utilization of local networks to sell products | ENERGIA, IFC |
| | Organization of customized marketing events | ENERGIA, Kopernik |
| | Combining RE sales with other products | ENERGIA, IFC, Kopernik, SURE |
| | Commission based sales | ENERGIA, IFC, Kopernik, SURE |
| | Specific products suitable for different markets | Cambodia ICS programme |
| Women's leadership and agency | Systematic agency and leadership training and refresher courses | ENERGIA |
| | Training on digital and financial literacy, legal rights, women's health, wellness and nutrition, sustainable living practices | IFC, SURE, Barefoot College |
| | Supporting each other through ICS Association | Cambodia ICS programme |
| Enabling environment | Close link with national energy access programmes | ENERGIA, EmPower |
| | Devise approaches to integrate gender in the national renewable energy sector | EmPower, Sumba biogas programme |



Photo: Abbie TTraylor Smith / DFID

Even though each context is different and we must resist from making generalizations, some broad lessons and insights that can be drawn from these experiences are as follows.

An integrated support package is needed to systematically address multiple barriers to growth faced by female entrepreneurs.

Because the factors limiting women's entrepreneurship are manifold and intertwined, integrated measures are needed to address these. They need to be supported through a comprehensive package, including capacity-building on technical, managerial, business management and marketing aspects of energy businesses as well as in leadership and empowerment. As discussed in the ENERGIA case study, an important part of the package is support from designated mentors who provide specific, customized and timely support to the entrepreneurs and demystify 'business' for them.

Access to finance is important but must be accompanied by a combination of other measures.

Access to finance is a major challenge that women entrepreneurs are faced with. However, finance must necessarily be accompanied with financial literacy, and the ability to manage cash flows, debts and assets, as businesses grow. In addition to access to appropriate types of finance, entrepreneurs also need the financial knowledge and skills to feel confident starting and growing businesses with a high potential (Dutta 2019). At the same time, financial institutions need to be supported to look beyond traditional collateral-based lending and adopt innovative (and likely more effective) forms of appraisal is a powerful way of expanding access to women entrepreneurs. (Strobbe, 2015).

Engaging family members, including men, is critical.

When women entrepreneurs grow their businesses, dynamics in the household and the family can change. Engaging husbands, partners, and male family members to ensure their buy-in and support is critical. Linking women entrepreneurs with trusted male mentors and role models in other sectors can help them overcome some of the persistent barriers they face, such as mobility, and transition into more profitable businesses.

The enabling environment (legislation, policies, regulations, and support institutions) is just as important to success as direct support to entrepreneurs.

In addition to the direct support to entrepreneurs, the systemic barriers in developing countries that may impede women's economic empowerment must be addressed. A conducive, enabling environment that supports women's enterprise development in renewable energy includes (a) enabling fiscal policies for off-grid renewable and cooking energy products, (b) industry standards and certification of quality-assured market products, and (c) ease of doing business for women, including streamlined processes for business registration and licensing, easy access to information, guidance, application submission, and follow up (Dutta 2019).

No single organization can provide all of the multiple resources that women entrepreneurs need, in order to grow sustainably.

Hence, practitioners have to bring together a number of stakeholders who need to operate in tandem: entrepreneurs, renewable energy companies, specialized support organizations, financial institutions, civil society organizations, women's support groups and the public sector. Together, they need to perform multiple functions: to provide a conducive policy and regulatory environment; to facilitate access to funding; to provide business development support and mentoring; to link entrepreneurs to markets; and to strengthen value chain as a whole. One of the roles that ENERGIA took on in the WEE programme was to act as a champion institution for the women's renewable energy enterprise approach, and to galvanize the many actors needed to provide the range of inputs needed to support women's energy entrepreneurship.



The way forward in a post COVID world

The COVID-19 pandemic is not yet over. When it is, governments and people at large will have transformed priorities, needs and vulnerabilities. In addition to containing the pandemic and mitigating its immediate socio-economic consequences, governments and leaders are getting ready to deal with the unprecedented and long term economic and human crisis that the pandemic has brought with it. While economic stimulus packages are being designed to provide short-term boosts, now is also the time for preparing to rebuild and reshape economies and bring back renewed, sustainable progress and prosperity.



Photo: Chai Sokunthea / Asian Development Bank

In a post COVID-19 world, keeping climate action, renewable energy and gender equality as an integral part of their growth plans can help governments deliver jobs and inclusive growth while ensuring that their energy systems are modernised, more resilient and less polluting. The emerging global action on green economy houses a valuable opportunity to foster women's entrepreneurship in the renewable energy sector. Women's energy entrepreneurship offers twin advantages: the strategy is effective in reaching energy services to the last mile communities, and at the same time, it can drive larger developmental goals of women's empowerment and poverty eradication. While a number of organizations have started working in this area, ongoing efforts need to be improved substantially if they are to bring about significant developmental gains for the poor and women. In doing so, the following are priority actions for the Asia region.

- As an immediate and cross-cutting action, all COVID-19 response measures should: (1) place women, girls, youth and women's organizations at the heart of the response; (2) transform the inequities of unpaid care work into a new, inclusive care economy that works for everyone; and (3) design socio-economic plans with an intentional focus on the lives and futures of women and girls (United Nations, 2020b). An important part of this is to ensure women's representation in COVID-19 economic recovery plans and energy sector planning.
- Governments must make clean cooking part of their pandemic emergency response plans (Clean Cooking Alliance 2020). Workable models include India where the government is giving away millions of cooking gas cylinders to those in need, and Ghana, which is subsidizing electricity costs for three months for the poor. Other governments should follow their lead, while ensuring clean cooking fuel providers are supported with the resources needed to minimize supply chain disruptions.
- Many women daily wage workers and micro- and small entrepreneurs engaged in climate-sensitive sectors may not be able to repay their loans, as their incomes have diminished. Proactive economic stimulus and financing measures, such as extending moratoriums on repayment of loans, financial industry bailouts, investments in cleaner energy or conditional assistance to carbon-intensive sectors to cut emissions, can ease the immediate burden (UNEP and UN Women 2020).

Action points for national and local governments

Countries are increasingly mainstreaming DREA solutions within their national energy access strategies, which provide a strong foundation promoting women's enterprises on renewable energy (IRENA 2019d). However, several countries continue to have at least some laws that overlook women's economic opportunities, especially related to the informal sectors where most women in developing countries work. Efforts to foster women's entrepreneurship must start with policy reforms that address the underlying causes of gender gaps and gender discrimination which cut across a range of areas. Actions related to policy and regulatory frameworks that governments must take in order to build a conducive environment for women's energy enterprises include the following.

(A) Ensure that climate actions and energy sector policies make a clear commitment to addressing social and gender inequalities.

- Clearly articulated commitments to gender equality provide a reference point for leadership as well as the staff working on national policies and programs, thereby putting in place an accountability mechanism. Bangladesh is one such example of a country that has recognized women's key decision-making roles: its Country Action Plan for Clean Cookstoves (2013) recognizes that women make the majority of household purchasing decisions and are, therefore, integral stakeholders in any national awareness and education campaign on efficient energy use (Prebble and Rojas 2017). Another example is the 2004 National Energy Policy Document of Fiji, which, in its section titled "Energy Sector Institutions," calls for improved governance in its national energy sector: "The operation of these institutions will become more accountable and transparent, and their membership will become more representative, particularly in terms of participation by women." (Prebble and Rojas 2017).
- Instruments such as the NDCs, NAPs, NAMAs, and REDD+ form an important link between national planning and international climate policy and finally support the mobilization of international support. Gender-responsive actions in NAMAs, for example, can include can potentially include working on renewable energy, the health and environmental implications of biomass energy, women's workloads and building the capacities and decision-making abilities of women in the use and maintenance of energy and energy efficient appliances (see box on Georgia).

(B) As part of their energy access strategies, governments must raise their efforts to promote women entrepreneurs in RE technologies and services. In doing so, they must

- Support integrated and holistic energy planning that take into account not only the least-cost approaches but also consider co-benefits of energy access measures like poverty reduction, gender equality and environmental sustainability, thereby making DREA options as well as women-centric approaches viable alternatives to grid extension to achieve universal energy access.

- Electrification planning and strategies should clearly identify those areas of the country that will be reached by grid extension within a reasonable time frame, as well as those suitable for off-grid solutions, so that these markets can be covered through alternative approaches including RE and women's enterprises.
- Ensure that the institutional framework is conducive to women utilizing the opportunities offered by renewable energy sector. Some countries have created new institutions to support rural electrification activities, while others have placed the responsibility for rural electrification within existing agencies. In Bangladesh, financial institutions have been empowered to champion the development of the off-grid sector (e.g., IDCOL in Bangladesh). Through its multiple interventions, IDCOL has also been utilizing renewable energy to benefit women.
- Invest in building the capacity of organizations working on such business models - to develop technical, business and leadership skills and advocacy capability, with a focus on elevating the level of women to become leaders at all levels.
- Leverage the work done by women's networks, including women entrepreneurs, and civil society organizations working simultaneously on the delivery of energy services, poverty reduction and gender equality.

(C) Create a business and regulatory environment that supports women's entrepreneurship and economic activities. This includes a number of actions in multiple sectors.

- Mainstream gender in national MSMEs policies (OECD and ASEAN 2017):
 - Align national MSME development policies with policy directions set in national women's empowerment and gender equality commitments.
 - Facilitate linkages between the ministries responsible for women's affairs and the ministries responsible for MSME development and more effective implementation of gender mainstreaming in MSME policies and measures.
 - Encourage business and industry associations to extend their memberships to rural women entrepreneurs and those working on renewable energy.
- Encourage women's leadership and involvement in decision-making at all levels: Policy processes and decision-making at national, sub-national and local levels should be strengthened to ensure full participation of women.
 - Ensure that women have platforms to voice their opinions, aspirations and priorities and incorporate them into policy and implementation.
 - Promote women entrepreneur networks, including those working on renewable energy. Co-operation and partnerships between national and international networks can facilitate entrepreneurial endeavours by women in a global economy.

Gender responsive Nationally Appropriate Mitigation Action (NAMA) in Georgia

Georgia has developed the first gender-sensitive NAMA on low-cost water heating solutions for households. The population of Georgia, especially in rural areas, suffers from a lack of access to safe and sustainable energy, especially for heating, which is a serious issue in the cold country. In Georgia, mostly women are responsible for the unpaid work in the house and have fewer opportunities to participate in economic activities.

The NAMA includes installation of 20,000 units of solar heaters or energy-efficient stoves, which builds on community energy cooperatives with a high involvement of women in leadership. Women also made up 40 percent of the project's trainees in energy system maintenance and use. Given the high reliance on biomass fuels and the prevalence of low-efficiency stoves in the country, this is an effective path to emissions reduction, while at the same time improving health and reducing the use of fuelwood (Bock et al 2015, UNDP 2016).

- Establish formal mechanisms for conducting policy dialogue with women entrepreneurs and ensure that they are represented in public-private dialogue fora and consulted on legislative and policy reforms
- Develop initiatives to build the ICT skills and capacity of women entrepreneurs. In order to reduce gender gaps in digital inclusion, digital literacy and use of ICTs are important tools to improve the productivity of women's enterprises.
- Ensure that the private sector and financial institutions' business and financial processes (e.g., credit reporting, opening hours of financial institutions) work for the benefit of women entrepreneurs and are simple and cost effective. Use popular media, such as radio, to disseminate easy-to-understand regulatory information for illiterate or semi-literate women and men.

Action points for donors and inter-governmental organizations

Women's energy entrepreneurship in developing countries is still at a nascent stage. Donors and development partners have a pivotal role to play in **building momentum around women's entrepreneurship in the energy sector**, through sharing successes and failures, supporting innovations and new business models and building capacity of organizations to undertake this work. At the same time, multilateral and bilateral organizations need to encourage and support the creation of an enabling environment for sustainable development. During crisis situations such as COVID-19 strong leadership and support of the multilaterals is essential in ensuring that governments and other stakeholders have knowledge and capacities to recover in a sustainable, inclusive and greener way (UNEP and UN Women, 2020).

- Finance for mitigation actions should be designed in a way that they complement broader developmental goals including women's empowerment, gender equality, poverty eradication and sustainable development. Carbon financing options should ensure equitable benefits for men and women by helping expand women's access to and control over energy and supporting their existing energy-related activities.
- Foster information exchange and learning between organizations working on women's enterprise development, and others such as health, water and livelihoods.
- Raise awareness among financial institutions about women entrepreneurs' needs and introduce incentives for them to provide appropriate, accessible and flexible financial products and services (including for example, fair interest rates, affordable insurance).
- Support research on rural women's entrepreneurship (at local, regional or national levels) and disseminate information on good practices in promoting sustainable businesses run by women. Some areas that merit research include (i) What are the conditions that make it easier for women entrepreneurs to transition from the informal to the formal sector; (ii) What kind of business models are best suited to take into account the social norms that impact women

- and encourage collaboration among family and community members; (iii) which methodologies are best suited to define and track "empowerment" and other impacts on women's lives; (iv) What are the drivers for decision makers to include or not include gender issues in their energy policies; (v) Which types of women's energy entrepreneurship are most effective at expanding energy access and (vi) what is the relationship among violence against women, sexual harassment and entrepreneurship (ENERGIA 2019; ADB and the Asia Foundation 2018).

Within the Asia Pacific region and beyond, the Empower project can play a crucial role, by supporting innovative actions at the ground level, sharing these lessons at the national and international levels, and supporting governments in the region to develop supporting policies and programmes.

Action points for development practitioners and civil society

- Ensure that gender is factored into energy projects, specific actions throughout the project cycle are required: a gender-gap assessment, a plan of action for interventions, and a focus on monitoring and evaluation that tracks the narrowing of gender gaps (IEA et al 2020). The design and development of DREA projects should be based on full understanding of gender gaps and opportunities the needs of women, as consumers and as potential entrepreneurs. Specifically, as part of programming,
 - Improve the collection and analysis of reliable data on women's enterprises including on access to and use of energy, decision making, household division of labour, productive uses of energy
 - Include gender-responsive indicators, programme/ project evaluations, lessons on what does or does not work and why, and feedback mechanisms.
 - Incorporate mentorship programmes and community awareness raising etc.
- Support gender-sensitive, demand driven business development services (BDS) to strengthen women entrepreneurs' business management, marketing and technical skills, with an emphasis on growth.
 - Provide technical assistance to BDS providers in modifying the content, delivery, and facilitation approach of training and advisory services to respond to the varied needs and realities of rural women led enterprises.
 - Enhance women entrepreneurs' skills on RETs, as well as numeracy, ICTs, business management, record keeping, and marketing. In doing so, make use of experiential learning methods to strengthen rural women's leadership skills and self-confidence.
- Build and strengthen the capacity of rural women entrepreneurs' organizations such as cooperatives, self-help groups, women's business associations to advocate for and serve the needs of their members.

Action points for private sector and finance institutions

- In partnership with research institutes, improve results measurement frameworks so as to better capture the success factors of capacity- building programs for women entrepreneurs
- Civil society should work closely with grassroots communities to understand their unique challenges and provide support in mitigating the impact of COVID-19.
- Support and encourage financial institutions to design and use products and services specifically targeted to women entrepreneurs, including simplification of procedures and financial literacy training
- Provide knowledge and understanding to FIs on how to profitably reach the women's market
- Explore partnerships that better link access to finance with capacity-building programs
- Identify support-program mechanisms for women entrepreneurs that can have an impact on the entire value chains where women entrepreneurs are concentrated.
- In market researches, include gender dimensions on access to and use of energy, decision making, household division of labour, productive uses of energy, and entrepreneurship.

Organizations such as the Global Banking Alliance for Women (GBA), a consortium of financial institutions and Women's World Banking who provide financial services to women entrepreneurs, can play a major role in driving this agenda forward.



Conclusions

In the achievement of universal energy access, renewable energy technologies are going to be a cost-effective and scalable solution. Renewable energy solutions have proven to be flexible, reliable, adaptable to local energy needs, and often represent a smarter solution than grid extension. At this point, the COVID-19 pandemic and its social and economic impacts have created a global crisis, making it harder than ever for the poor and vulnerable to maintain their livelihoods including paying for and using electricity and cleaner cooking options, all at a time when they need it the most. Women are among the worst hit by the pandemic. The Asia-Pacific region is already home to a large number of people without electricity and without clean cooking fuel, and one impact of COVID-19 could be decreased investment in energy access, as national budgets refocus on other priorities. In the immediate future and beyond, energy access is going to be more important than ever, and critical for enabling communications, connecting people, powering healthcare systems, supplying clean water and sanitation facilities, lighting up spaces and minimizing risks of

violence and abuse. Clean and affordable energy access will also increase the resilience of communities, for example, by ensuring food security by powering agriculture, irrigation and food processing and storage. Renewable energy solutions will be needed for the foreseeable future therefore it is imperative to support the development of sustainable, inclusive markets, ensuring that low income people have access to affordable, reliable and economically viable technologies.

Experience has shown that placing women at the center of energy access interventions can drive deeper and more sustainable development outcomes, and promoting renewable energy through women's entrepreneurship will provide multiple co-benefits including those on SDGs 1, 7, 5, 3, 8 and 13. Post-COVID-19 economic recovery plans must include equitable access to and control over sustainable energy services for women and men as an essential right to development. Moving forward, energy access is essential, and supporting women entrepreneurs to deliver clean energy to their communities is more important than ever.



Photo: Victoriano Jr, Danilo O

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