

GENDER-RESPONSIVE RENEWABLE ENERGY PROGRAMMES



Photo: UN Environment Programme

A Review of Existing Initiatives on Women's
Leadership in Renewable Energy

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TABLE OF CONTENTS

04

Introduction

06

Purpose of the
Review

07

Categorization
of Initiatives

28

Conclusion

31

References



Photo: UN Environment Programme



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In Photo: Mang Oun from Cambodia cleaning the solar panel used to power a water pump

INTRODUCTION

The International Renewable Energy Agency or IRENA (2019) examined the renewable energy transitions happening across the globe and noted that despite recent developments in women's participation in the sector, women were still very much underrepresented. The report found that women make up only 32% of the total renewable energy workforce, out of which, 45% is involved in administrative work, 28% in technical work, and 35% in non-technical work (International Renewable Energy Agency [IRENA] 2019). Women also lacked presence in entrepreneurship, management, senior leadership roles, and on corporate boards (IRENA 2019).

Because the energy value chain is largely gender-blind, it fails to recognize women's contributions. This said, once rural women

are provided with access to renewable energy and the business opportunities that come with it, a more gender-inclusive and sustainable society could be within reach.

Integrating a gender equality perspectives into renewable energy policies and programmes not only makes sense socially and environmentally, but also makes good economic sense. In a rural context for example, freeing up women's time from unpaid domestic and care work through basic infrastructure and access to clean modern energy opens up more time in their day to spend on productive activities, contributing to local economies while also promoting women's economic empowerment and poverty alleviation (Wodon & De La Briere 2018). Similarly, owning renewable energy businesses give women more



Photo: UN Environment Programme/Nexus for Development

In Photo: In Cambodia, an initiative by Nexus for Development that transforms waste into biogas, producing fertilizer

freedom and control over their assets, so they can get greater access to financing and have the opportunity for business expansion.

The gender inequalities in the region continue to affect women's and men's lives in profound and measurable ways. Women and men have different levels of access, use, and control of energy. This gendered dimension needs to be understood in order to develop more inclusive and effective energy policies that can contribute to gender equality and ensure sustainability.

Access to renewable energy can provide economic opportunities for women by increasing their access to climate resilient livelihoods, higher levels of income and production, and financing as well as other assets - all of which contribute to gender equality. It also addresses the concern that women are more likely to experience marginalization if renewable energy policies and programmes do not sufficiently include the perspectives of both men and women.

In addition to gender considerations in energy policies and frameworks, there must be a provision of targeted training

that should also be supported by employment placement, established financial instruments, and other enabling social policies, so that the transition to renewable energy does not end up exacerbating already existing gender inequalities. The absence of these factors would only make it more difficult to achieve broader human development goals including those related to alleviating poverty and ensuring employment equity as articulated in the Sustainable Development Goals or SDGs (International Energy Agency [IEA] 2019).

Gender in Energy: A Global Insight

An analysis of 192 national energy frameworks from 137 countries showed that only a third of the frameworks include gender considerations to some extent (Prebbles & Rojas, 2017). From those that do, women are mostly characterized as potential stakeholders or beneficiaries. Only 2 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 potential to make significant contributions to the economy and fail to recognize the part they play in the informal economy — which is often an important source of employment for women in developing countries. Moreover, just 14 energy frameworks identify women's ministries and organizations (or equivalents) as implementing partners, tasked with specific activities (United Nation Environment Programme [UNEP] 2020).

PURPOSE OF THE REVIEW

This report takes stock of the ongoing experiences related to gender-responsive renewable energy programmes as well as the consolidated wealth of knowledge and lessons learned in this field. Although a number of gender-inclusive renewable energy-based programmes do exist and are documented individually, they are scattered across regions. Thus, it is important to consolidate success stories and lessons learned, and disseminate findings amongst policy makers and stakeholders to support the scaling up of effective gender-responsive renewable energy policies and programmes.

Under the EmPower: Women for Climate-Resilient Societies project that is jointly implemented with UN Women and funded by the Government of Sweden, UNEP has been supporting women entrepreneurship in the renewable energy sector since 2018 in Bangladesh, Cambodia, and Viet Nam, as well as at the regional level. Through this review, UNEP hopes to further contribute to generating opportunities for a broader scale gender-responsive renewable energy intervention in the future.

Therefore, the purpose of this review is to:

- a) Present relevant information on various gender-responsive renewable energy projects and programme interventions, that have already been implemented in different geographic contexts;
- b) Identify critical policy and programme design options and under-

stand which issues must be addressed for effective policymaking around gender and renewable energy at the national and local level; and

- c) Provide concrete advice and entry points to government stakeholders, policymakers, energy sector agencies, energy practitioners, civil society groups as well as, development organizations and financing institutions on how to advance their work on gender-responsive renewable energy programmes.



Photo: UN Environment Programme/GreenID

In Photo: Site of solar-powered water pump used for horticulture nursery management in Viet Nam

CATEGORIZATION OF INITIATIVES

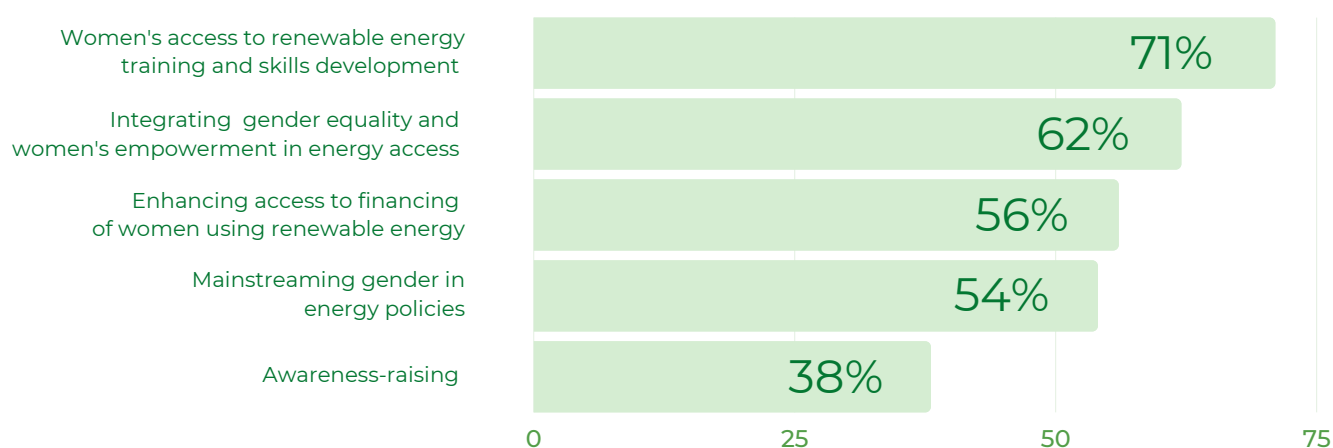
Gender-responsive renewable energy programmes involve various types of interventions, depending on the measures required to improve women's engagement in renewable energy as well as the types of stakeholders that need to be engaged. These can include policymaking ministries and regulatory bodies, research and academic institutions, start-ups, financing institutions, development practitioners, and communities, among others. These entities each have their own operating cultures that are different from each other's so the philosophies or norms that influence their perception of gender issues and how to address them would also vary.

There is no standard process to categorize renewable energy programmes; however, in this report, the different gender-responsive programmes that have been

identified through secondary research can be categorized according to the various measures utilized to upscale women's participation in the renewable energy sector, as identified through the IRENA online gender survey of 2018 (shown in Figure 1) as well as, according to the available information around various projects and their specific focus.

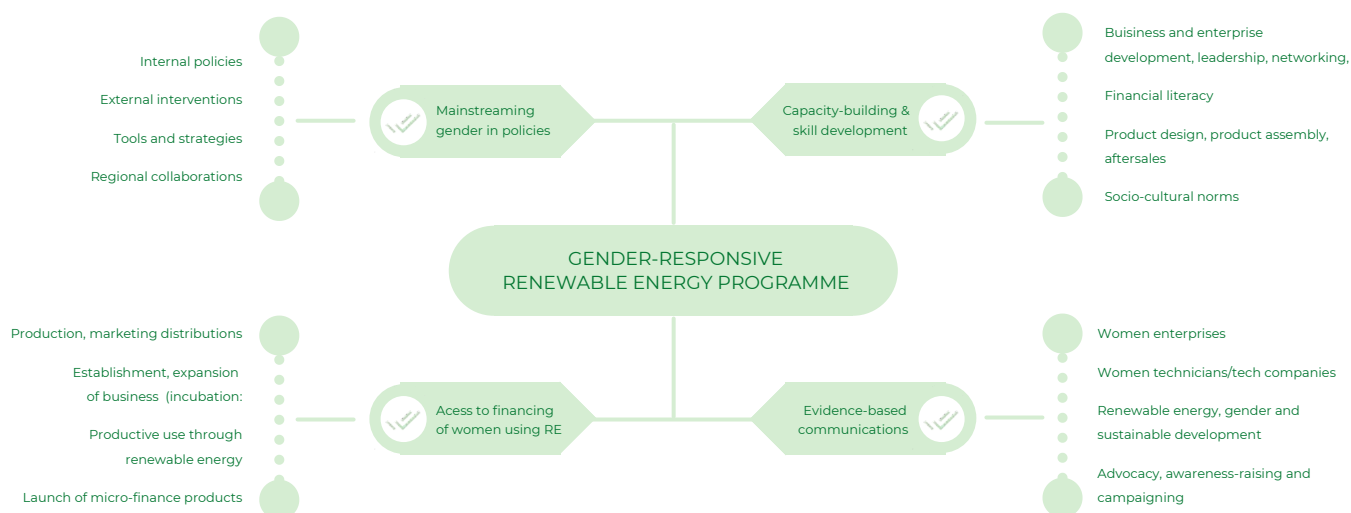
Based on the analysis undertaken for this review, the most common focus areas of gender-responsive renewable energy programmes include mainstreaming gender in renewable energy policies; capacity-building and skill development; women's access to financing; and evidence-based communications, and awareness-raising. These four categories are depicted in Figure 2.

Figure 1. Measures to upscale women's participation in the renewable energy sector



Source: IRENA, 2018

Figure 2. Categories of gender-responsive renewable energy programmes



Source: Authors compilation

Programmes on mainstreaming gender in energy policies

An assessment was prepared by the International Union for Conservation of Nature’s (IUCN) Global Gender Office (GGO), ENERGIA, and the International Network on Gender and Sustainable Energy covering 137 developed and developing countries. The Energizing Equality Report examined 192 energy frameworks including policies, plans, and strategies from these countries in order to ascertain the extent gender was being integrated into national-level energy policies and it revealed that 46% of Asia-Pacific frameworks (22 out of 48) assessed included at least one or more keywords that referred to gender, as seen in Figure 3 (Prebble & Rojas 2017).

The Asia-Pacific region performed well in comparison to countries that belonged to the Organisation for Economic Co-operation and Development (OECD), the Latin America and the Caribbean (LAC) region, and the Middle East and North Africa (MENA) region (Prebble & Rojas 2017). This was determined by the inclusion of certain keywords in national frameworks

that would facilitate the development of gender-responsive energy policies and action plans that promote gender equality and women's empowerment thereby improving women's livelihoods and the lives of their families (Prebble & Rojas 2017).

Another interesting finding of the Energizing Equality Report is related to the characterization of women in national energy frameworks. The roles of women in the energy policies that were assessed are presented in Table 1.



Photo: UN Environment Programme/Nexus for Development

In Photo: New stove designs and market models open doors for cleaner cooking options in Laos

Figure 3. Regional comparison of gender inclusion in national energy frameworks

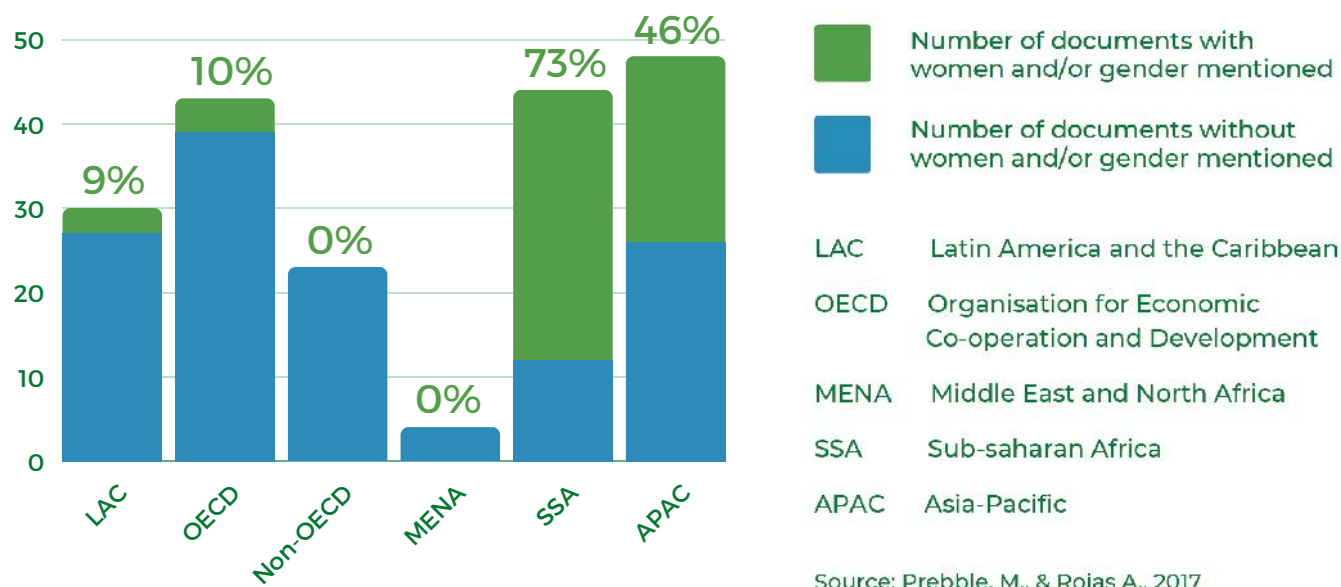


Table 1. Characterization of women in national energy frameworks

DESCRIPTION OF WOMEN	DETAILS
Women as vulnerable	<p>Ten frameworks (5%) identify “women as vulnerable”</p> <p>Examples:</p> <ul style="list-style-type: none"> Maldives National Energy Policy and Strategy (2010) Zambia’s National Energy Policy (2008)
Women as beneficiaries	<p>Thirty-two energy frameworks (17%) identify “women as beneficiaries”, either of specific interventions or more broadly of key objectives</p> <p>Examples:</p> <ul style="list-style-type: none"> Nigeria’s National Renewable Energy and Energy Efficiency Policy (2014) Marshall Islands’ National Energy Policy, Volume 1 (2009)
Women as stakeholders	<p>Thirty-eight energy frameworks (20%) identify “women as important stakeholders” in energy sector governance and decision making at the local or national level</p> <p>Examples:</p> <ul style="list-style-type: none"> Bangladesh Country Action Plan for Clean Cookstoves (2013) “Energy Sector Institutions,” the National Energy Policy Document of Fiji (2004)

Table 1. Characterization of women in national energy frameworks (continued)

DESCRIPTION OF WOMEN	DETAILS
<p>Women as agents of change</p>	<p>Of 192 total documents, only two categorize women as agents of change, recognizing women's potential to unlock more effective energy activities and to drive policy change.</p> <p>Examples:</p> <ul style="list-style-type: none"> • The Action Plan for Gender Issues that exists within Nigeria's National Energy Masterplan (2014) involves the organization of meetings that allow women, community-based development partners and other stakeholders to participate in the energy policymaking process of the government. • The role of women as both consumers and producers of energy at home and in the field of business was recognized in the Republic of Mauritius' Long-Term Energy Strategy (2009) as key to achieving the country's energy savings and energy efficiency goals.

Although currently there are very few policies considering women as agents of change, the policies and frameworks should aim to achieve it.

Further it has been found that various cross-cutting gender issues are being reflected in energy frameworks. For example, Nepal's rural energy policy recognizes the adverse health impacts that traditional energy sources have on women and children. Therefore, it is important to identify the enabling conditions that would mainstream gender into their national framework, which can be done by considering the nexus of energy, gender, and time poverty; energy and women's health and wellbeing; gender and energy in rural or urban areas; etc. Examples of these cross-cutting issues are presented in Figure 4.

Programme on gender mainstreaming in energy access in West Africa

The ECOWAS Programme on Gender Mainstreaming in Energy Access (ECOW-

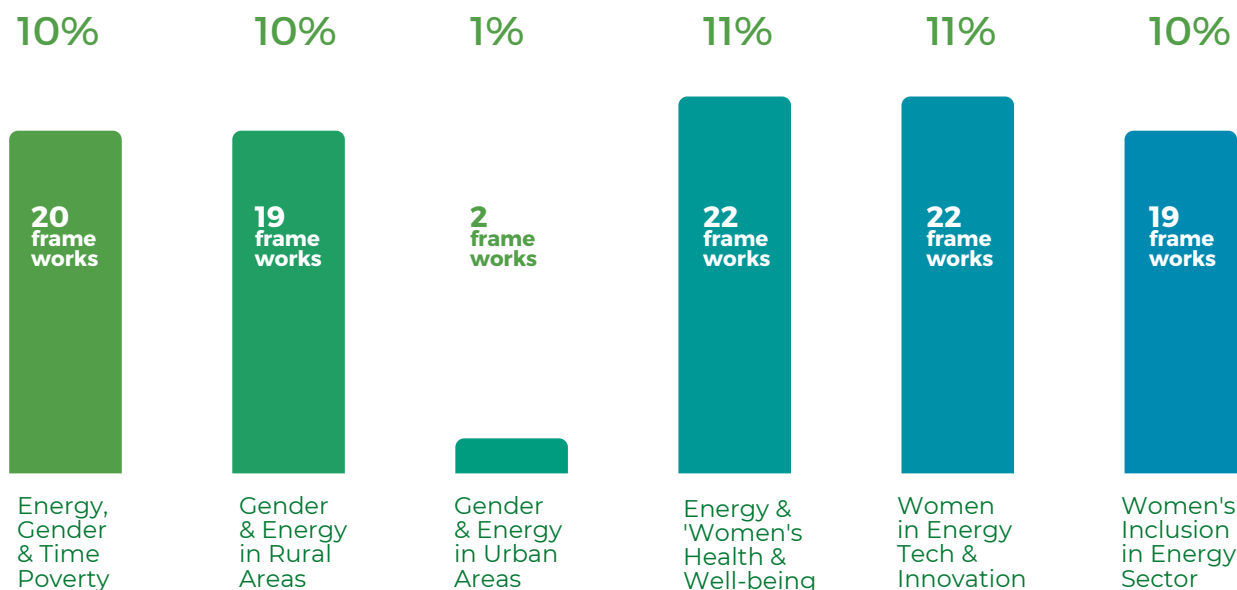
GEN) is implemented by UNIDO in partnership with the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE).

The objective is to develop specific gender sensitive policies and incentive instruments while instilling gender awareness among policymakers and empowering women entrepreneurs and technicians. This project covers 15 countries in the ECOWAS region and a timeline of the policymaking process that was undertaken is presented in Figure 5.

It identifies the following as the main components of this project:

- Financing from the ECOWAS Women's Business Fund that gives women-led energy businesses access to grants and training for establishing and expanding their businesses;
- Knowledge exchange and technology transfer among women groups with expertise in various energy-related

Figure 4. Cross-cutting gender issues that are being reflected in energy frameworks



Source: IRENA, 2019

technologies facilitated by the Women's Technical Exchange Programme;

- Involvement of the initiative known as Women's Economic Empowerment through Energy for Productive Uses that enables women from rural areas to increase their agricultural productivity by helping them to use renewable energy and more energy-efficient technologies;
- Gender mainstreaming in energy programmes and projects that can

address inequality in energy access in West Africa through the development of regional gender and energy policies, national strategies, capacity building and advocacy;

- Involvement of the Youth Leadership Development in Energy that empowers young women and men in West Africa to shape and influence energy-related developments by providing research grants that support the development of high-quality, relevant studies proposing solutions to topical issues.

Figure 5. Timeline of policy formulation during implementation of ECOW-GEN



Source: Authors compilation



Photo: UN Environment Programme

In Photos: (L) Women engaged in the solar drying of fruits in Viet Nam; (R) Woman collecting dried fruits using solar energy in Viet Nam

Island Women Open Network (IWON) for sustainable energy and climate resilience in island nations

This partnership between the Small Island Developing States (SIDS) Sustainable Energy and Climate Resilience Initiative, UNIDO, and other regional organizations aims to promote the integration of gender in the sustainable energy sector of small island developing states in Africa, the Caribbean, the Indian Ocean and the Pacific Ocean (United Nation Industrial Development Organization[UNIDO] 2015).

Aside from linking international agreements to what is actually happening on the ground, IWON also plays an important role in convening a powerful group that advocates for sustainable energy and gender issues in SIDS (UNIDO 2015). Moreover, it brings together regional and national energy-gender programmes and implementors. Examples of these include ECOW-GEN as well as, the Secretariat of the Pacific Community's initiative on gender mainstreaming (UNIDO 2015). Among the network's notable supporters are the Global Forum on Sustainable Energy, the Clinton Foundation, and the Austrian Development Agency (UNIDO 2015).

ENERGIA's gender-auditing approach to engendering energy policies and frameworks

ENERGIA has developed a gender audit methodology and implemented it in many countries including in India, the Philippines and Pakistan with an objective of identifying and analyzing factors that hinder the mainstreaming of gender in energy policies and identify the gaps in energy policies. Such an audit has proven to be useful for action planning by governments. For example, a gender audit conducted in Kenya was essential to influencing key actors to adopt gender-responsive approaches in their planning processes. These decision makers were part of the Ministry of Energy and Petroleum, Kenya Power, and two Kenyan NGOs (Prebble & Rojas 2017).

UNEP's guide to gender integration in renewable energy policy

The UN Environment Programme (UNEP) developed the guide to introduce and improve the integration of gender issues in renewable energy policies, plans, and strategies. It provides practical ways to step



In Photo: Goat farming using solar energy in Bangladesh under the EmPower programme

up commitments in renewable energy policy in an inclusive and gender-responsive way. UNEP, under the EmPower project, launched the Guideline during the ASEAN Energy Business Forum in 2020 and applied the tool in trainings for government officials from Bangladesh and Cambodia.

[UNEP and UN Women's e-learning tool on gender, climate, and renewable energy.](#)

The online course is available on the UN:CC Learn platform and can be used by renewable energy policy makers and financial institutions working in the RE sector. It focuses on building the capacity of users to better implement gender-responsive renewable energy policies and programmes.

Programmes focusing on enhancing the access to financing of women using renewable energy

Shankar, Elam Glinski (2020) observed that women entrepreneurs cannot be treated as a homogeneous group so the type of capital they need would also be different based on the type of business they have set up, whether that is a community collective, micro-enterprise or small and medium-sized enterprises (SMEs). Each of these would entail its own set of financial, knowledge, and skills requirements. The stage of the business growth must also be factored in because a start-up would have a different set of needs than a business looking to expand its operations (Shankar, Elam, Glinski 2020).

Commercial banks, equity funds, micro-credit, angel investment, grant funding, or venture capital can provide financing but the limited availability of seed funding for start-ups has been noted by many experts as a major barrier for women-owned business (Asian Development Bank [ADB], 2018,;Shankar, et al 2020).

Key factors for gender-transformative energy policies

- Raising awareness amongst various government and non-government stakeholders about the relevance and importance of gender sensitive policies and the kind of impact it can create along with sex disaggregated data
- Ensuring that there is **no discrimination** so the interest of both women and men are taken into consideration in the development of energy policies
- Having **equal participation** in the entire process from all relevant stakeholders (i.e. Ministry of Energy, Ministry of Finance, Ministry of Women Affairs, Statistics Department, etc.)
- Ensuring there is **accountability** and ownership
- Securing **political buy-in** is extremely important from the very beginning if engendering activities are to be carried out/presented to inter-ministerial working groups or a council of ministers and if the policy is to be adopted by a council of ministers or heads of state
- Having **transparency** in the planning and implementation process to promote and increase the participation and capacity of women and men

Not being able to secure the loans they need for business growth is also cited as a common cause for women's enterprises to shut down (ADB 2018). Table 2 summarizes the salient features of a few of the funds available for supporting women's entrepreneurship through renewable energy.

Secondary research was done to identify the programmes on women enterprise development, renewable energy, and access to finance. During this process, it was observed that there are very few programmes covering all three of these aspects together. However, a deeper review and analysis of the types of funding available suggest that these funds can also be used and accessed for promoting women-led entrepreneurship in renewable energy, if the narrative is defined to include it and the project design reflects it accordingly. It was also found that several types of funds and funding/investor databases exist for enterprise development so supporting and mentoring the women who could potentially access those funds is a major requirement.



Photo: UN Environment Programme

In Photo: Kem Oun from Cambodia uses solar energy for vegetable production

Table 2. Types of funding available to women entrepreneurs in the renewable energy sector

	TYPE OF FINANCING	PURPOSE OF THE FINANCIAL INSTRUMENT
Women Entrepreneurs Finance Initiative (We-fi)	Debt, equity, venture capital, and insurance.	Housed in the World Bank Group and funded by fourteen governments, it aims to give women in developing countries access to finance, markets, and training/mentoring/networks.
Women in Technology Venture Fund (WIT)	Venture capital fund	The Business Development Bank of Canada provides funding for women-led technology companies in Canada to grow their business in STEM
GET.invest	Debt, equity and grant facility	A European programme which supports investments in decentralized renewable energy, not only on women entrepreneurship. It targets private sector businesses and project developers, financiers, and regulators to build sustainable energy markets in partner countries. The funding database contains a broad range of financing instruments covering debt, equity, and grant facilities. The programme works across different market segments of decentralised renewables, such as small on-grid independent power producers (IPPs), commercial and industrial power, mini-grids, small stand-alone solar systems including solar home systems, and clean cooking solutions. Currently, it is focused on sub-Saharan Africa. https://www.get-invest.eu/funding-database/
UNEP's EmPower Fund	Grant to leverage public or private sector finance	Available in 3 countries (Bangladesh, Cambodia, and Vietnam), the fund aims to tackle what is currently preventing climate-resilient women-driven businesses using renewable energy, from accessing directly funds from financial institutions (FIs). It provides the needed financial assistance through a cash-backed loan collateralization to both potential borrowers and FIs. The EmPower fund is also available as a co-funding mechanism or can serve as viability gap funding for implementing renewable energy-based women entrepreneurship projects. www.empowerforclimate.org
Global Energy Efficiency and Renewable Energy Fund (EEREF)	Fund-of-funds	Leverages public sector funds to catalyse private sector investment into clean energy projects. GEEREF's investments aim to provide access to sustainable energy, combat climate change and deliver compelling financial returns. Although this fund is not specifically for women, women can avail of these funds for small and medium enterprise development through renewable energy technologies. https://geeref.com/portfolio.html

Table 2. Types of funding available to women entrepreneurs in the renewable energy sector (continued)

	TYPE OF FINANCING	PURPOSE OF THE FINANCIAL INSTRUMENT
WCI Fund	Venture capital fund	The Women and Climate Impact Fund aims to transform women's lives by mobilizing investments in climate projects that contribute to women's empowerment and measure impacts using the W+™ Standard.
Global Impact Investing Network (GIIN)'s Energy Access Fund	Debt finance; working capital finance	Available to both men and women, the investment objective of the Energy Access Fund is to bridge the gap towards more universal access to modern energy, by providing debt financing to entities which operate across the entire value chain in the energy sector. These small and medium size businesses (SMEs) operate in developing markets, and largely target low income households as well as SMEs. The ultimate beneficiary is typically the population with limited, unreliable, or no access to energy. The fund provides working capital financing to companies selling solutions that provide access to clean energy to underserved populations. https://thegiin.org/case-study/energy-access-debt-fund
SELCO Energy Access Fund	Equity-based fund	Suited to fit the needs of enterprises and delivery of sustainable solutions to the poor, the focus of the fund is to support business model innovations around tested technologies but may take early stage sustainable technology development risks in exceptional cases. It prioritises underserved segments (either as owners, partners or customers) and seeks to serve/include even more disadvantaged and excluded segments. It is available for both men and women. https://selcofund.in/
ADB Special Fund	Grant and loans	Provides loans and grants from Special Funds that help reduce poverty in ADB's poorest borrowing countries. Although these funds are not specifically designed for entrepreneurship development, they can be customized to accommodate the entrepreneurship programme. The fund supports technical assistance grant components of investment projects, and any other activities that may be agreed upon between financing partners and ADB.
Kiva and US Department of State's Women Entrepreneurship Fund	Crowd-funding	Aims to empower women entrepreneurs globally by increasing their access to safe and affordable capital. https://www.kiva.org/her

Table 2. Types of funding available to women entrepreneurs in the renewable energy sector (continued)

	TYPE OF FINANCING	PURPOSE OF THE FINANCIAL INSTRUMENT
Micro-enterprise Development fund, Nepal	Grant	<p>Micro-enterprise Development Programme (MEDP) was a poverty reduction programme largely funded by Department of Foreign Affairs and Trade (DFAT), implemented by the Ministry of Industry with support from UNDP, which also contributed funding. Its first three phases (1998 - 2013) delivered an integrated micro-enterprise development programme, targeting women and the socially excluded. The programme gradually expanded its coverage to 38 districts. Given its demonstrated impact on poverty, the Government decided to institutionalize the approach in the form of a Micro-Enterprise Development for Poverty Alleviation Programme, which aimed to cover all 75 districts by the end of 2018. The project created 30,000 micro-enterprises. Through this programme, MEDFs were established and supported by the Government of Nepal as local bodies and donors pool their resources for its implementation.</p> <p>https://selcofund.in/</p>
EU programme (with fund) on Women and Sustainable Energy for developing countries	Grant	<p>Women Increasing Sustainable Energy Access and Use (WISE) is implemented by Barefoot Power together with three co-applicants: Lutheran World Foundation, Mesics Foundation and Barefoot Solar Engineers Association of Sierra Leone. The EU provides EUR 5.5 million for five years to help women establish sustainable businesses in Sierra Leone, Uganda and Kenya. The objective is to provide them with capital grants, technical and business trainings, and linkages with business incubators in the sustainable energy market.</p> <p>Economic and Social Development of Women through Renewable Energy in the Sahel is managed by Fundación Plan International Spain and its seven partners, including Ministries and National Agencies for Renewables. It intends to facilitate access to women entrepreneurship in the sustainable energy sector in Senegal, Mali and Niger. The project provides funding and training to women, allowing them to establish and launch micro-financial products in the sustainable energy sector. The EU contributes EUR 7.6 million.</p>
Technology and Innovation-based Enterprise Development Fund, Thailand	Grant	<p>The Ministry of Science and Technology, Bangkok launched The Technology and Innovation-based Enterprise Development (TED) Fund in 2017 with the intention of supporting innovation development among university students, researchers, SMEs, and startups.</p>

Table 2. Types of funding available to women entrepreneurs in the renewable energy sector (continued)

	TYPE OF FINANCING	PURPOSE OF THE FINANCIAL INSTRUMENT
Powering Livelihoods	Debt investing and equity investing	Powering Livelihoods, a CEEW-Villgro initiative, aims to boost India's rural economy by scaling up the penetration of clean energy-powered appliances for livelihoods. Over three years, the initiative will support at least five enterprises to undertake large-scale commercial deployment of their solutions and use the generated evidence to catalyse the sector.
Women's Fund of the Angel Investment Network, Indonesia	Equity investing	Angel investment networks are not prevalent in Asia and the Pacific, but the Indonesia experience stands out as a promising model for replication elsewhere.

Programmes focusing on women's access to training and skills development in renewable energy

In order to produce women entrepreneurs and resilient businesses, some key skills are required. There are various capacity-building and skill development programmes designed to enhance these skills amongst women entrepreneurs.

Although there may be considerable variation in then the content of the training programme, generally, they incorporate sales and marketing, businesses skills and market development, financial literacy, and training on entrepreneurial and growth mindsets. In addition to this, another type of training and skill development might focus on the technological aspects of renewable energy.

When it comes to scaling up SMEs, the most important innovation that can be leveraged is digital technology (Johns Hopkins University, Babson College & ICRW 2019). Information and communication technologies (ICTs) have been reshaping

the global landscape of entrepreneurship, especially in areas where there is a significant lack of available. It does this by providing people with new channels for communication, giving them access to more information and simplifying the process of monetary transactions (Johns Hopkins University et al 2019).

Johns Hopkins University, Babson College and the International Center for Research on Women (2019) also cited that traditional methods of increasing communications can be complemented by emerging forms of ICTs to improve learning opportunities, support mentoring and coaching, create linkages to markets and provide rapid feedback on community or environmental concerns. Thus, in order to facilitate the development of more energy-based SMEs, the latest ICT advancements must become more accessible and affordable to women entrepreneurs. The following table (Table 3) consolidates various capacity-building and skill development programmes that caters to women entrepreneurs in the field of renewable energy.

Table 3. Summary of capacity-building initiatives for women in renewable energy

NAME OF PROJECT OR PROGRAMME	ORGANIZATION AND FOCUS AREA	SUMMARY / DESCRIPTION OF SALIENT FEATURES
<p>Empowering Women as Managers in the Renewable Energy Sector</p>	<p>APEC</p> <ul style="list-style-type: none"> • Renewable energy technologies • Markets and policy • Business plan preparation 	<p>The project aimed to develop the skills and confidence of women to advance in their careers as leaders & entrepreneurs while also developing a viable energy product. The training programme implemented from 1 May through 30 November 2018, increased participants' knowledge of renewable energy technologies, markets and policy to enable them to develop sound, comprehensive and convincing business plans for a renewable energy project or business. It also gave them the chance to pitch their business ideas & benefit from real-world expertise and feedback. Participants were selected through a multi-stage merit-based process. The project began with the admission of 50 women into the programme to initiate the online training. Those that advanced to subsequent phases developed business concept notes and worked with mentors who coached them in the development of full business plans.</p> <p>https://www.apec.org/Publications/2019/04/Empowering-Women-as-Managers-of-the-Renewable-Energy-Sector</p>
<p>Women's Development Centers (WDC)</p>	<p>Ministry of Women's Affairs (MoWA) of the Royal Government of Cambodia (RGC)</p> <ul style="list-style-type: none"> • Project management • Enterprise development 	<p>The overall goal of this project was to reduce poverty by increasing access to services that support women's social and economic empowerment. Project had four components: 1. WDC facility development in Siem Reap and upgrading in Kampong Chhnang 2. Life skills training and advocacy support for women 3. Micro and small enterprise development and support 4. Capacity building and project management support.</p> <p>https://www.adb.org/sites/default/files/project-document/73002/39037-02-cam-tacr.pdf</p>
<p>Solar Mamas Program</p>	<p>Barefoot College</p> <ul style="list-style-type: none"> • Installation & maintenance • Assembling of lighting system • Repair and after sales 	<p>The Solar Mamas program, which has already improved tens of thousands of lives, is about bringing light – literally and metaphorically – to communities in Africa, Latin America, Asia and the Pacific Islands. Solar Mamas trains women to build, install and maintain solar panels and batteries, so they can deliver clean energy to their villages. Participants also learn how to build LED lamps, charge controllers, lanterns and home lighting systems, as well as how to store and repair components. The program is a perfect example of how a cross-sectoral partnership can create social change alongside clear, tangible business and economic benefits – generating lasting value for people who need it, advancing equality, as well as giving women agency and helping them become proficient in business.</p>

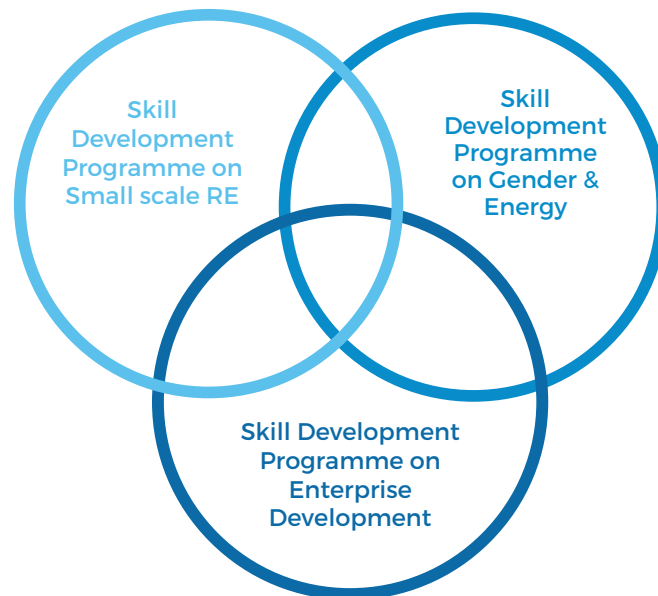
Table 3. Summary of capacity-building initiatives for women in renewable energy (continued)

NAME OF PROJECT OR PROGRAMME	ORGANIZATION AND FOCUS AREA	SUMMARY / DESCRIPTION OF SALIENT FEATURES
<p>PROMISE, Bangladesh</p>	<p>BRAC Institute of Skill Development</p> <ul style="list-style-type: none"> • Tailored mentoring support 	<p>PROMISE supports young entrepreneurs in Bangladesh to successfully develop their businesses. Its goal is to create decent employment opportunities through establishment of youth-led enterprises in local communities. The PROMISE programme is open to all business-minded young people in Bangladesh, and also provides a natural next step for STAR graduates who wish to start their own businesses. The programme includes activity-based classroom training, tailored mentoring support, and access to finance.</p> <p>http://www.brac.net/program/skills-development/promoting-business-incubation-for-small-entrepreneurs/</p>
<p>Capacity-building of Women in the Energy Sector</p>	<p>ADB</p> <ul style="list-style-type: none"> • Gender and leadership • Technical training on solar technologies 	<p>The project seeks to enhance women's participation in the energy sector as employees, services providers, consumers, and entrepreneurs through the following: a) the conduct of a gender diagnostic of the energy sector while establishing a baseline on women's participation in the energy sector value chain; (b) formulation of a national gender mainstreaming policy for the energy sector; (c) demonstration a replicable model of technical training for women on solar technology; and (d) design and implementation of gender and leadership training for women and men personnel of selected energy sector organizations.</p> <p>https://www.adb.org/projects/54111-006/main</p>
<p>Clean Energy International Incubation Centre</p>	<p>Social Alpha</p> <ul style="list-style-type: none"> • Lab to market support 	<p>It's a joint initiative of Tata Trusts and the Government of India supported by Department of Biotechnology, BIRAC, Tata Power and Tata Power – Delhi Distribution Limited. CEIC has been set up for promoting innovations in the energy space and has become the first International Incubator in India under Mission Innovation. The Incubator is designed to offer complete "lab to market" incubation support to clean energy enterprises, both Indian and International, which can bring about deep and irreversible social and environmental impact. CEIC supports the incubatees by providing last-mile connectivity and end-use deployment of successful research outputs. It offers complete lab-to-market support tailored to the needs of start-ups at the Clean Energy International Incubation Centre.</p> <p>https://ceic.socialalpha.org/</p>

Table 3. Summary of capacity-building initiatives for women in renewable energy (continued)

NAME OF PROJECT OR PROGRAMME	ORGANIZATION AND FOCUS AREA	SUMMARY / DESCRIPTION OF SALIENT FEATURES
Online Women Entrepreneurship Programme	TERI	<p>Women Entrepreneurship Development Programme (WEDP) under the Department of Science & Technology scheme aims to train the S&T graduates and diploma holders in the essentials of entrepreneurship. 25-30 potential women entrepreneurs are selected and trained through a structured 4-week online programme.</p> <p>https://www.teriin.org/event/online-women-entrepreneurship-development-programme-wedp</p>
ECOWAS Renewable Energy Entrepreneurship Support Facility	IRENA, ECREEE <ul style="list-style-type: none"> • Mentorship support • Technical aspect for small and medium-sized renewable energy 	IRENA and ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) established an ECOWAS Renewable Energy Entrepreneurship Support Facility, the aim of which is to provide “mentorship” support and advisory assistance to small and medium-sized renewable energy (particularly Solar PV) entrepreneurs on matters related to technical issues (system sizing, installation guidelines, etc.), business management and operations, and project proposal refinement, as well as supporting entrepreneurs to successfully bring their innovative ideas to fruition.
Women Barefoot Solar Engineers	Barefoot College International	The vision of Barefoot College International is to create vocational and educational opportunities accessible to women and girls from the most marginalized communities around the world. By training women to become solar engineers, even if they are illiterate or have no formal education, rural resilience is forged one village at a time.
Business Incubation Programme	Centre for Entrepreneurship Development, BRAC University	<p>Centre for Entrepreneurship Development (CED) of BRAC University (BRACU) endeavors to inspire, devise, nurture, develop, and elevate entrepreneurship through innovation, institutional capacity, and leadership.</p> <p>http://ced.bracu.ac.bd/</p>
Gender and Energy Capacity-building Program	USAID	<p>The overall goal of this project was to reduce poverty by increasing access to services that support women’s social and economic empowerment.</p> <p>https://www.usaid.gov/powerafrica/gender</p>

Figure 6. Diagram of skill development programs on gender and renewable energy



There are also various networks involved in advocacy activities related to the gender and energy nexus as seen in Table 4.

There are several enterprise development programmes that do not specifically target women and some that may not cover the renewable energy aspects; however, these skill development programmes cover various modules such as that of enterprise development, sales and marketing, financial literacy and others which would be equally relevant and can be used by women entrepreneurs.

In general, there are relatively few programmes which may cover all the three aspects of gender, enterprise development, and renewable energy (Figure 6). Therefore, whenever a new programme on women entrepreneurship development through renewable energy is initiated, the related skill development programmes that exist should be mapped. At the same time, the learnings, experiences, resource materials, and local expertise gathered so far should be used and aligned with the newly initiated programme.

Programmes integrating gender equality and women's empowerment in energy access

This section consolidates number of projects implemented on the intersection of renewable energy, women's economic empowerment, and climate resilience. Although this is not a comprehensive list of all projects being implemented globally, it gives a fair idea of how RE is used for women's economic empowerment and building climate resilient livelihoods.

EmPower: Women for Climate-Resilient Societies

The EmPower project (2018-2022) is jointly implemented by UN Women and UN Environment Programme (UNEP), in Bangladesh, Cambodia, and Vietnam as well as at the regional level through the component on knowledge sharing and capacity building. The project aims to contribute to the overall long-term outcome of countries in Asia and the Pacific being able to implement gender-responsive climate change and disaster risk reduction (DRR) actions that address

Table 4. List of networks working on gender and renewable energy and supporting capacity building initiatives

NAME OF NETWORK	YEAR FOUNDED	LOCATION OF ACTIVITIES
ENERGIA (International Network on Gender and Sustainable Energy)	1996	22 African and Asian countries Gender mainstreaming, strengthening women-led energy enterprises, advocacy
WRISE (Women of Renewable Industries and Sustainable Energy)	2005	United States Fellowships, awards, webinars, networking, training retreats, in-person and online mentoring
Hypatia	2010	Germany Networking, events WISE (Women in Solar Energy) 2011 United States Education, capacity building, advocacy, strategic partnerships, networking, events
WICS (Women in Cleantech and Sustainability)	2011	United States Fostering networks of professionals to advance women's role in the green economy (energy and other sectors)
WiRE (Women in Renewable Energy)	2013	Worldwide Capacity-building field trips, networking, awards recognition programmes, student bursaries, speed mentoring Women in Sustainability, Environment and Renewable Energy
WISER	2015	United Arab Emirates Advocacy, education and training opportunities for women, platforms for dialogue, showcasing of women's contributions to sustainability Renewable energy and energy efficiency Women's Network
GWNET (Global Women's Network for the Energy Transition)	2017	Worldwide Interdisciplinary networking, advocacy, training, coaching and mentoring, and services related to projects and financing
GOGLA	2012	GOGLA is the global association for the off-grid solar energy industry. Established in 2012, GOGLA now represents over 180 members as a neutral, independent, not-for-profit industry association. Its services assist in building sustainable markets and profitable businesses delivering quality, affordable off-grid electricity products and services to as many customers as possible across the developing world.

the key drivers of gender-based vulnerabilities.

In order to achieve this, the project invests in five outcome areas including one that enables women to use renewable energy to increase adaptive capacity and enhance the climate-resilience of livelihoods. Thus, the programme has been supporting women entrepreneurs through policy advocacy, business skill training and capacity building, improving access to finance for women to pilot renewable energy based enterprise development projects along with actual on-the-ground installation of such enterprises. Visit www.empowerforclimate.org for more information.

The Women's Economic Empowerment (WEE) Programme of ENERGIA

From 2014 to 2018, WEE was involved in the development of women-led enterprises that incorporated renewable energy in seven countries that included Indonesia, Kenya, Nepal, Nigeria, Senegal, Tanzania, and Uganda (Dutta, 2018).

With the support of the Centre for Rural Technology Nepal, Energy 4 Impact, Kopernik Solutions, Practical Action Eastern Africa, Solar Sister, and ENERGIA, the programme enabled more than 4,000 women to establish and expand clean energy businesses in the countries mentioned above (Dutta, 2018). The women-led micro enterprises catered to the needs of more than 2.9 million consumers who were usually located in rural areas and belonging to underserved communities (Dutta, 2018). Through WEE, this often overlooked market was given access to clean energy products and services (Dutta, 2018). For more information, visit www.energia.org.

MLINDA Foundation's Women Enterprise Projects in India

Mlinda is a non-government organization that works specifically in areas that are considered to be ecologically sensitive as well as highly underdeveloped (Alliance for Rural Electrification [ARE] 2022). They try to curb environmental degradation through the implementation of programmes that are designed to reduce GHG emissions, that advocate the use of eco-friendly goods while lessening the consumption of environmentally harmful products (ARE 2022).

This NGO's flagship project is focused on the renewable energy-based electrification of rural areas in Jharkhand and West Bengal in India that makes use of pico and micro grids to power homes and businesses (Alliance for Rural Electrification 2022). Mlinda not only helps local women's groups to incubate enterprises but also supplies power using renewable energy (ARE 2022). For more information, visit www.mlinda.org.

Solar Urja Lamp (SoUL)

It aims to provide 7 million rural students with high quality, affordable clean light in the form of these solar lamps. This scheme is part of an ambitious, an initiative of Indian Institute of Technology (IIT) Bombay. Ministry of New and Renewable energy (MNRE), the focal ministry on RE in India, has targeted to provide 7 million solar study lamps to students from 22,000 villages in 385 blocks spread across 49 districts. Now dozens of the women are set to turn entrepreneurs as they have been selected to open solar marts near their villages to sell various solar products. It is a part of next phase of the SoUL project to develop enterprise among rural women.



Photo: UN Environment Programme



Photo: UN Environment Programme



Photo: UN Environment Programme

In Photos: (L) Solar drying of mushrooms in Viet Nam; (R above) Site of solar drying for mushrooms; (R below) Vietnamese women engaged in mushroom production using solar energy

This is an initiative that enables women from local villages in rural areas to assemble and distribute solar study lamps, helping to address the lack of a stable source of electricity which greatly affected students as well as low-income families (Khan 2018). Nearly 500 women of three districts in Bihar, India who have been empowered through this promotion of renewable energy by earning a livelihood for themselves. They assemble the study lamps, distribute them and ensure their repair and maintenance. Each woman earns INR 480 daily (USD 6) by assembling 40 solar study lamps. It was not easy for them to learn the technical skills required for manufacturing these lamps. A team from IIT Bombay trained them. More than two-dozen assembling and distribution centres are being set up in the rural areas of Bihar. It is an initiative of the state's rural livelihoods mission called Jeevika.

Lighting a Billion Lives Campaign of TERI

The Energy and Resources Institute (TERI) launched Lighting a Billion Lives camp to set up energy enterprises in underserved areas. Their entrepreneurial model brings together a wide range of stakeholders from across the energy value chain to create an enabling market environment (Lighting a Billion Lives 2018).

By identifying whether the stakeholders are interested in delivering energy services for social or commercial purposes, solar solutions provided by the programme are not only more relevant but also more affordable to end users (Lighting a Billion Lives 2018). Entities engaged have included government agencies, multi- or bi-lateral organizations, community-based partners, sponsors, manufacturers of different



In Photo: Cambodian women setting up a mobile solar water pump under the EmPower programme

technology, local entrepreneurs involved in the energy sector and end users (Lighting a Billion Lives 2018). To learn more, visit http://labl.teriin.org/delivery_model.php

Kopernik's Wonder Women Initiative

Since its inception in 2011, more than 300 women have been empowered to sell clean energy technologies in remote areas of Indonesia after having acquired the necessary skills, tools, and confidence to become successful social entrepreneurs in their own communities (World Access to Modern Energy 2022). Through their micro-enterprises, they sell products such as solar lamps, water filters, and clean cookstoves (World Access to Modern Energy 2022). Visit www.wame2030.org/project/1116/ for more information.

Solar Sister: Increasing Women's Economic Opportunities and Enhancing Last Mile Sustainable Energy Access

This initiative involved becoming a women-led and women-driven last mile distributor that brings clean energy access to

underserved communities in Sub-saharan Africa. Solar Sister sources products, manages the wholesale, and supports retail sales. Over 4,000 Solar Sister Entrepreneurs and over 1.6 million people across Sub-saharan Africa have already been reached by the initiative. To know more, visit, www.solarsister.org.

Setting Up an e-Cluster in a Social Center: In Bangladesh

ADB's project entitled Enabling Poor Women's Benefits from Enhanced Access to Energy in Hatiya Island tackled gender, energy, and livelihoods by offering disadvantaged women with 'multi-range energy-based services' that included livelihood opportunities (ADB 2018). In a social activities center, the women were provided with access to innovative technologies designed specifically for them such as an e-cluster or a container-based solar photovoltaic battery (ADB 2018).

An e-cluster usually has the capacity for integrated LED lighting for indoor and outdoor use, ventilation using direct or alternating current, a PV-powered water pump and filtration system, cold storage as in freezers used for preservation of perishable goods, and an internet facility (ADB 2018). Because it was located in a social activities center, the e-cluster was able to provide women cooperatives with electricity-based services that allowed them to set up restaurants, open shops for different handicrafts, and connect to the internet (ADB 2018). For more information, visit www.adb.org and read the Tip Sheet on Gender-Inclusive Approaches in the Energy Sector.

Women Entrepreneurs Light The Way For Solar Products In India

The Lighting Asia/India project of IFC was able to establish partnerships with various

solar distributors in India. This enabled the development of a women entrepreneurs' network that became known as Solar Sahelis which was critical to overcoming the challenges related to selling in last-mile markets such as those located in remote areas (International Finance Corporation [IFC] 2017). Helping women become distributors as well as customers allowed the project to build the market for off-grid solar lighting. Decreasing associated costs and raising awareness resulted in a 30 percent increase in sales, serving to further open the solar lighting market (IFC 2017).

The Solar Sahelis network was comprised of self-employed women recruited from self-help groups (IFC 2017). The network made it possible for local women to gain access access to the tools they needed to start and run their own businesses which included funding and technical assistance (IFC 2017). For more information, visit www.ifc.org.



In Photo: Water pumps running on power from solar PV system benefit women farmers



In Photo: Vietnamese women engaged in noodle production using solar energy

CONCLUSION

Summary

- There are many ongoing initiatives that focus on gender-responsive renewable energy programmes; however, they are somewhat implemented in silos, and the experiences and learnings are not widely known to other related stakeholders.
- There seems to be more initiatives on renewable energy and women's entrepreneurship in the African region than in Asia-Pacific or at least those experiences from the African region are being shared and documented more widely. With a growing demand for renewable energy and its potential for diverse use in various women's enterprise development, there is a need to showcase good examples of gender integration into renewable energy sector from the Asia-Pacific context.
- Many of the case studies showed that in order for more women to establish, operate, and grow their businesses, they need greater access to financing and financial services as well as, a risk-sharing facility for scaling up SMEs. There are several kinds of funding mechanisms that exist (including crowd funding, venture capital fund, angel investment etc), which need to be explored and mapped as they could be classified under innovative financing resources. Additionally, being able to make connections across geographic locations may be particularly beneficial to women-owned SMEs (ADB 2018).

- The social capital aspect of entrepreneurship across the Asia-Pacific region ecosystems is a barrier to women-owned enterprises being able to achieve their growth potential. Women do not have the same level of access men have to business networks which limits their opportunities to learn from other's experiences, develop the right business contacts, and get the kind of market information they might need (ADB 2018).
- Mobile phones, computers, as well as, internet connectivity are some forms of ICTs that are essential to driving and accelerating growth and development. Although these have been used by women entrepreneurs in Central Asia, the same level of access was not observed for rural women in Southeast Asia and the Pacific (ADB 2018).
- Women have less access to information, relevant education, and training opportunities that will build their skill set in setting up a renewable energy business.
- In Asia and the Pacific, there has been sporadic use of innovative funding that connects people from different places such as in crowdfunding or peer-to-peer funding and this could be leveraged by women who own SMEs (ADB 2018).

Recommendations

- Policy infrastructure that is broad-based and mutually reinforcing with buy-in at the highest level in support of women's roles and entrepreneurship in RE is required. In order to execute it, regular efforts should be given to bring the evidence and benefits to the policy-makers through presentations, round table discussions in the regional fora,

Photo: UN Environment Programme/Buksh Foundation



Photo: UN Environment Programme/Buksh Foundation

In Photo: Helping women entrepreneurs provide solar energy access to rural, un-electrified villages of Pakistan

discussions in various high-level renewable energy working groups (for example renewable energy working groups of ASEAN, APEC, SAARC etc).

- Developing women's capacities on renewable energy is essential to drive the change forward, involving women in particular in the training is a must. Further, access to digital technologies and ICTs can potentially bring financing from alternative sources to women entrepreneurs as well as expanding the marketing and business reach. For example, crowdfunding is able to connect women entrepreneurs across Asia and the Pacific with investors within and outside of the region. Similarly, women entrepreneurs can expand their businesses through online sales and marketing. Hence, in addition to increasing women's skill sets in financial literacy, business development, and sales and marketing, special attention should also be given to how to build confidence in, as well as how to access and use, digital technologies and ICTs in order to sustain and expand their business, specifically in a post Covid-19 scenario.

- The goal in developing any funding mechanism for renewable energy and women enterprise development should be to find one that is best fit for purpose. Fit-for-purpose should always be a guiding force is developing financing structures and proper cost benefit analysis and risk mitigation strategies need to be developed along with the financing structure.
- In order to be successful and sustainable in its implementation, Government's green action plans and renewable energy policies have to strengthen gender integration and ensure the perspectives of both men and women are captured. Initiatives working specifically on gender-responsive programming and policies should work jointly to scale up the work and make the benefits of gender integration visible to a broader audience of stakeholders in the renewable energy sector.
- Women networks and leaders working in the RE sector should be further supported and mentoring programmes for women in RE sector should be established.



In Photos: (L) Solar rooftop system with a capacity of 15kwp installed in An Giang, Viet Nam; (R) Vietnamese woman storing fish using a solar-powered refrigeration system

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