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GENDER AND ENERGY: OPPORTUNITIES FOR ALL

Editors Ana Pueyo and
Mar Maestre



| | |
|---|-----|
| Notes on Contributors | iii |
| Introduction: Gender and Energy – Opportunities for All Ana Pueyo | 1 |
| Global Trends Impacting Gender Equality in Energy Access Rebecca Pearl-Martinez | 7 |
| Strengthening the Women’s Entrepreneurship Ecosystem within the Energy Sector Anita Shankar, Amanda B. Elam and Allie Glinski | 27 |
| Gender and Entrepreneurship in the Renewable Energy Sector of Rwanda Manuel Barron, Rowan Philip Clarke, Amanda B. Elam, Rebecca A. Klege, Anita Shankar and Martine Visser | 53 |
| Promoting Women’s Entrepreneurship in Distribution of Energy Technologies: Lessons from ENERGIA’s WEE Programme Soma Dutta | 71 |
| ENERGIA’s Gender and Energy Research Programme: Findings and Experience from Research for Policy Annemarije Kooijman-van Dijk | 91 |
| Glossary | 111 |

Promoting Women's Entrepreneurship in Distribution of Energy Technologies: Lessons from ENERGIA's WEE Programme^{*†}

Soma Dutta¹

Abstract In the energy access space, women's entrepreneurship has gained momentum in the last few years. ENERGIA, International Network on Gender and Sustainable Energy, has been implementing the Women's Economic Empowerment (WEE) programme since 2014, focusing on developing women's enterprises in the clean energy sector. With its five partners, ENERGIA has supported more than 4,000 women in clean energy businesses in seven countries. WEE programme experience in the dissemination of clean energy technologies shows women entrepreneurs to be effective in 'last-mile' distribution for affordable clean energy technologies through their social networks. Supporting women entrepreneurs calls for a multi-pronged strategy combining the approaches of enterprise development and women's empowerment. Useful tactics to promote women energy entrepreneurs include combining technology and business skills upgrading with empowerment and agency building; sustained mentorship support; and trust-based one-to-one selling approaches. There is also a need to take an ecosystem approach that places an equal emphasis on the enabling environment and direct support to entrepreneurs.

Keywords: gender, energy, women's entrepreneurship, economic empowerment, last mile.

1 Introduction

The United Nations 2030 Agenda for Sustainable Development provides an ambitious roadmap to eradicate poverty and achieve sustainable development for all. The Sustainable Development Goals (SDGs) seek to address key challenges such as eradicating poverty and hunger, eliminating inequalities and violence against women, and achieving sustainable energy for all. While the SDGs recognise separately the importance of gender equality and energy access, in reality these are inextricably linked, and addressing them together can

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offer multiple development gains. More broadly, gender equality and women's economic empowerment can bring significant gains in human development and wellbeing for individuals, families, and societies through many channels, such as enabling greater autonomy and choice for women and boosting investment in children (UN Secretary-General's High-Level Panel on Women's Economic Empowerment 2016). Increasing the share of household income controlled by women tends to increase spending on children's education and health (World Bank 2011).

In this context, women's entrepreneurship in energy is gaining recognition as an emerging strategy to bring energy services to unserved and underserved communities that collectively also represent a huge economic growth potential (ENERGIA, World Bank Group/ESMAP and UN Women 2018; SEforALL 2018; OECD 2010). This is in line with the thinking that female entrepreneurship represents an untapped source of innovation, job creation, and economic growth in developing countries (Niethammer 2013).

Despite these developments, engaging women as entrepreneurs is yet to be viewed as a 'mainstream' strategy for 'last-mile' energy access, and the opportunities surrounding women's energy enterprises are far from being realised. Female entrepreneurs operate well below their potential owing to gender-specific barriers that include discriminatory gender norms, lower levels of education and business experience, competing demands of family responsibilities, and limited access to financing and to productive resources (Kelley *et al.* 2017; Mastercard 2017; Global Entrepreneurship Monitor 2017, cited in SEforAll 2018; FAO, IFAD and ILO 2010). Further, systematic documentation and literature on the strategies and impacts of women-centric entrepreneurial approaches to expanding energy access are limited mostly to clean cooking (Clancy, Oparaocha and Roehr 2004; Rewald 2017; SEforAll 2017, cited in Johns Hopkins University, Babson College and ICRW 2019) and the approaches are not sufficiently well known in the energy sector. For these reasons, national governments and private sector and development partners are yet to invest in these at a scale that can make a meaningful dent in the projected access gap.

ENERGIA, International Network on Gender and Sustainable Energy, has been implementing, together with its partners, the Women's Economic Empowerment (WEE) programme in seven countries – Senegal, Kenya, Uganda, Tanzania, Nigeria, Nepal, and Indonesia – since 2014, focused on developing women's enterprises in the clean energy sector and in the productive use of energy.² During this period, more than 4,000 women were supported in setting up energy businesses and have delivered clean energy products and services to 2.9 million consumers, mostly in rural areas and in low-income communities. The objective of this article is to share insights into the WEE programme experience to create and upscale new approaches that promote women as energy entrepreneurs. The article is targeted mainly at practitioners who are working with, or are interested in working with, women entrepreneurship models in the energy access space.

The article starts with a description of the analytical perspective adopted, followed by an overview of the WEE programme strategy. The subsequent sections are a deep dive into three specific areas: training and mentoring women energy entrepreneurs; sales, marketing, and promotion; and supply chain development and management. I acknowledge that there are other important strategies such as access to finance, but these are not covered in this article. This is followed by a discussion of the results achieved by the programme. The article concludes with thoughts on broader programmatic and management lessons that go beyond individual strategies.

2 Methodology and analytical perspective

This article presents the results of a self-reflection process as a learning methodology that was undertaken collectively by the WEE programme partners. Spread over more than six months, the process involved a comprehensive mapping of strategies adopted by each partner; the classification of strategies under different themes such as finance, sales, and promotion; and analysis of each strategy, separating what worked from what did not and why. In addition to the iterative process of developing the narrative, it drew on numerous progress reports, mission reports, webinars, blogs, PowerPoint presentations, phone calls and face-to-face learning events and meetings. An important source of data was the end-of-project surveys that were commissioned in each of the seven countries and an external evaluation commissioned by ENERGIA (Sustainable Energy Solutions 2017). The end-of-project surveys included a structured survey of 700 entrepreneurs that received programme support and 1,490 users of energy products, key informant interviews, and focus group discussions. Overall lessons were compiled into a publication (Dutta 2018), which this article draws upon.

The article attempts to analyse the various strategies with which the WEE programme employed in different contexts. It draws out common features of the most promising strategies, as well as lessons from efforts that did not go so well – or failed completely. In the context of strategy, it examines the obstacles that women entrepreneurs face and shares possible strategies to counter these. While the enterprises operate in varying sectors and have unique products and services, they all experience comparable challenges and share a common objective, and their comparative analysis revealed common features in their ways of working and their business models.

In the context of the WEE programme, this article examines three questions that are central to the design, implementation and management of a women's energy entrepreneurship programme.

- 1 For a programme implementer, what are the good practices or key elements of a successful business model to engage with women micro-entrepreneurs involved in the sale of clean energy products? In the context of this article, a good practice is one that has proven its relevance as an effective way to achieve a specific objective; solves a particular problem and has a positive impact on women and

- men individually and/or communities and institutions; is feasible to learn and to implement; helps men and women to improve their livelihoods and empowers them; and has the potential for replication and should therefore be adaptable and cost-effective (FAO n.d.).
- 2 Utilising these strategies, what were the results achieved in terms of economic empowerment impacts on women entrepreneurs and their families and on energy access for the communities, especially the poor rural ones they serve?
 - 3 What lessons can be learned from the WEE programme from a management and programmatic point of view?

3 The WEE programme approach

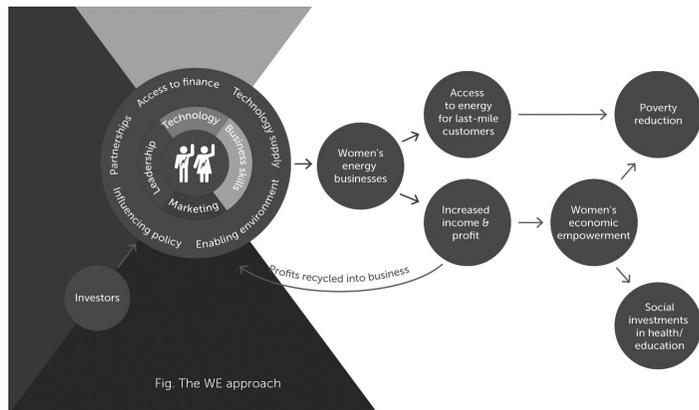
The WEE programme is implemented under the overall umbrella of ENERGIA by five partners: Practical Action Eastern Africa, with Sustainable Community Development Services (SCODE) as co-partner, in Kenya; Centre for Rural Technology, Nepal (CRT/N), with the National Association of Community Electricity Users Nepal (NACEUN) and Practical Action Consulting as co-partners, in Nepal; Kopernik Solutions in Indonesia; Solar Sister in Nigeria, Tanzania, and Uganda;³ and Energy 4 Impact, with Social and Ecological Management Fund (SEM Fund) as co-partner, in Senegal.

The central objective of the WEE programme was to achieve economic empowerment for women, through entrepreneurship in clean energy and productive use of energy. There are several definitions of 'empowerment': Kabeer (2001) defines empowerment as 'the expansion in people's ability to make strategic life choices in a context where the ability was previously denied to them'. It involves both individual agency – the idea of acting on one's own behalf – and collective actions to engage in a process of transformative change. Economic empowerment has been defined by the Organisation for Economic Co-operation and Development (OECD) as the capacity of women and men to participate in, contribute to, and benefit from growth processes in ways that recognise the value of their contributions, respect their dignity, and make it possible to negotiate a fairer distribution of the benefits of growth (OECD 2010). The notion of economic empowerment, as adopted within the WEE programme, encompasses all of these.

The programme design was centred on the belief that, because the factors limiting women's entrepreneurship are manifold and intertwined, integrated measures are needed to realise women entrepreneurs' potential. Accordingly, in collaboration with various stakeholder partners at national and sub-national levels, the organisations implementing the WEE programme provided:

- An integrated support package including skills development on technical, business, and leadership aspects; and
- Ongoing mentoring on business planning, growth, and capital access.

Figure 1 The WEE approach



Source Author's own.

The programme’s strategy encompasses a comprehensive entrepreneurship development process that entails a careful identification of the barriers women face in starting a business and then systematically addresses them (see Figure 1, which depicts the process adopted for women’s entrepreneurship within energy distribution value chains). After enrolling in the WEE programme, each entrepreneur receives training in technical and business aspects of energy businesses, as well as in leadership, empowerment, and agency – skills that transcend their energy businesses. Each of them also receives customised support from trained mentors, who help them on an ongoing basis to identify new market opportunities, develop marketing strategies, transact with suppliers and government authorities, prepare business plans, and negotiate with financial institutions. The mentors take the support package right to the entrepreneur’s place of work and demystify ‘business’ for them. The project also supports the partner organisations to strengthen product supply chains through linking them with international high-quality suppliers of energy products, and links entrepreneurs to financing institutions and with the local government.

In working with entrepreneurs, the partners work with a range of business models, continually evolving their strategies. As summarised in Table 1, the strategies can be broadly organised under the themes of recruitment; training and mentoring; promotion, marketing and sales; distribution; and access to finance.

4 Teaching and practising entrepreneurship through technology and business training, agency and empowerment training, and mentoring

When entrepreneurs enter an energy business, they have to deal with challenges related to, for example, unfamiliar technologies, learning to reach out to new customers and negotiating with suppliers, in addition to the gendered barriers that women face. To deal with these, they need continued support until their enterprises are mature and they are confident of running them independently. The WEE programme

Table 1 Strategies adopted by WEE partners in different countries in working with micro- and small-scale women entrepreneurs

| | Practical Action | Solar Sister | CRT/N | Energy 4 Impact | Kopernik Solutions |
|---|--|--|--|--|--|
| Country of operation | Kenya | Tanzania, Uganda | Nepal | Senegal | Indonesia |
| Recruitment | Through existing groups such as village savings and loan associations (VSLAs) Community meetings used to spread project information | Women with background in nursing, teaching, farming, and business Recruitment using community champion model | Members of microfinance institutions and those endorsed by community-based organisations are preferred Community meetings used to spread project information | Members of existing women's groups preferred Community meetings used to spread project information | Women with social or community services encouraged to join as entrepreneurs Community meetings used to spread project information |
| Learning and practising entrepreneurship: training and mentoring | In-session start-up and refresher courses (technology, business skills, and leadership) Mentoring through technology and business mentors | Start-up and refresher courses (technology, business skills, agency empowerment, and leadership), provided through sisterhood groups | In-session, start-up and refresher courses (technology, business skills, and leadership), separate for starting and existing businesses | In-session start-up and refresher courses (technology, business skills, and leadership) Mentoring through technology and business mentors | In-session start-up and refresher courses (technology, business skills, and leadership) Mentoring through technology and business mentors |
| Promotion, marketing, and sales | Market assessments used to develop focused marketing strategies Women supported to register businesses, brand products; local networks to sell products | All entrepreneurs are equipped with a shirt, backpack, and marketing materials, with clear branding Entrepreneurs use sales techniques such as Site Seller for personal, one-to-one selling | Generic promotion on improved cookstoves (ICSs) through linking with local government programmes and channels | Village chiefs and local community leaders are informed about the project and activities Organisation of customised marketing events and support to entrepreneurs | Entrepreneurs are trained in conducting technology fairs Village chiefs and local community leaders are invited to technology fairs Wonder Women are equipped with branded shirt, tote bags, and marketing materials |
| Reaching the last mile | Women members of VSLAs make own sales reaching out to other counties Women are hired as commission agents to sell in distant locations | Solar Sister entrepreneurs live and work in last-mile communities | ICS entrepreneurs hire other women in their district as sales agents on commission basis | Members of women's groups each make sales, reaching out in distant locations | Entrepreneurs hire other women, friends and relatives to reach distant locations and other islands |
| Finance facilitation | Using community-based savings groups that are empowered to lend to members | Entrepreneurs are provided with start-up kits but encouraged to purchase inventory in small batches in line with their affordability | For productive use applications, entrepreneurs are linked to local financing institutions Women's entrepreneurship development funds set by local community-based organisations | Loan guarantee fund used to ease loan terms and buy down interest rates to provide equipment on credit to entrepreneurs Support supplier credits | Early in the programme, technology was provided on a consignment basis Later, entrepreneurs were linked to local financing institutions but made little use of the credit functionality |

Source Author's own.

partners use a ‘recruit, train, and mentor’ approach to provide this support. After recruitment, the entrepreneurs participate in in-session training, which usually takes several days. This is followed by periodic shorter refreshers spread over a longer time. In parallel, the women receive one-on-one support from a designated mentor for at least a year, either individually or within small groups.

Before they start off, the entrepreneurs need to be trained in technology use and maintenance, sales and marketing, bookkeeping, public speaking, and agency and empowerment. Training involves everything from teaching entrepreneurs how to leverage existing networks for sales to managing their businesses. Specific areas for skill building include: technical, managerial, and business aspects of commercial operations; sales; legal requirements; equipment and inputs, and inventory management; and leadership, agency, and empowerment aspects.

A conclusion drawn from these five projects is that in-session training should combine business aspects with agency and empowerment. The reason for this is that one of the main challenges women entrepreneurs experience is lack of confidence in themselves. Being an entrepreneur calls for scaling new mountains every day, from opening a stall in the local market, to travelling in search of new customers, to managing monetary transactions and employees, and administering inventory. All of these require self-confidence and the courage to step out of one’s comfort zone, and a change in women’s perceptions of themselves. Research shows that, controlling for individual context and business characteristics, psychological factors are the strongest predictors of business start-up (Arenius and Minniti 2005; Elam 2008; Kelley *et al.* (2017), Johns Hopkins University *et al.* 2019). Accordingly, the agency/empowerment training provided covers aspects of empowerment (identifying and appreciating one’s own strengths, while developing positive mental habits to overcome limiting beliefs); leadership (developing understanding of leadership, developing a vision and setting goals for oneself, being proactive, solving problems, and improving communication); and business skills (marketing, financial planning, customer care, record-keeping, and business modelling).

In the WEE programme, mentoring has been a critical strategy for taking the project services to where the women entrepreneurs are, often in distant locations. Mentoring can be defined in several ways; for the WEE programme, it includes setting up a one-to-one relationship, in which an expert (mentor) provides consistent support, guidance, and practical help to a less experienced person (mentee) on a sustained basis (Lowbridge 2012). The mentor visits the mentee in order to provide specific, customised, and timely support. An important aspect of mentoring is goal setting and action planning. In every session, the mentors, in discussions with the entrepreneurs, agree on time-bound goals and make an action plan, which lays out the activities that are necessary to keep the entrepreneur on track. Action planning also helps to map out clearly where the mentee needs support, to agree on

goals that they can work towards, to gauge how they are doing and to celebrate when a goal is achieved. Another lesson learned was that mentoring is best viewed as a dynamic process: as businesses grow, the needs of the entrepreneurs evolve and, thus, the mentoring inputs must evolve accordingly. Initially, both business and technical aspects need equal and frequent attention. However, once businesses grow, the technology mentorship is scaled back and the business inputs are scaled up. In some cases, when the capacity needs of the various entrepreneurs become more similar towards the end of the project, a group mentorship approach is adopted, where entrepreneurs are mentored together in clusters while learning from each other's experiences.

5 Linking women to customers and markets

Creating an awareness and demand for clean energy products in last-mile communities is the first and most difficult part of marketing and sales. Building an appetite among risk-averse, mostly poor customers for clean energy products, particularly in rural locations, and establishing sales and distribution channels increases both costs and risks for entrepreneurs. For women trying to set up energy businesses, these challenges are even greater because of the additional constraints they have in terms of literacy, education, time, and mobility. The WEE programme intervention approach builds on two of women's most valuable assets, their social network of family, friends, and neighbours and the trust they enjoy in their communities. However, realising the potential of these assets requires women to be supported in a systematic manner.

First, women need to be coached on how to reach out to new customers, beyond their comfort zone. As Katherine Lucey, Founder of Solar Sister says,

When they start, women entrepreneurs run through their immediate market, which is their families, their friends, their neighbours, maybe their church group and then they hit a wall because now it's selling as a profession, which is a little bit different than selling as a hobby, you know, selling to your cousin or your sister (Pailman 2016).

Even though the initial sales are valuable ones, the enterprises will be sustainable only if they push themselves to sell in newer and further locations, going beyond their family and friends. And this is where sales training and mentorship support help, to step up to the next level of entrepreneurship. One effective strategy for selling beyond the 'inner circle' is holding technology demonstrations in public places. However, many of the implementing partners found that conducting demonstrations requires a high degree of skill. It is not sufficient to hand out promotional materials to the entrepreneurs: they have to be trained and to practise using the materials. Good practices in conducting successful technology demonstrations include:

- Organising product demonstrations during harvest or festival seasons, when people, especially farmers, have cash in hand.

- Organising demonstrations in areas where there is a large need for the technologies, such as off-grid areas.
- Ensuring the entrepreneur has a complete understanding of the product's features, including warranty and aftersales service.
- Ensuring the entrepreneur has some technology stocks with her for selling on the spot.
- When possible, inviting an influential figure (e.g. a village chief or government official) to attend the demonstrations.

Branding is another effective strategy to improve sales. In rural areas, where trust plays a major role in purchase decisions, the brand value of the organisation that the entrepreneur represents plays a big role. It is critical that potential customers know the brand well and associate it with quality and reliability. All the WEE programme partners equip each entrepreneur with a t-shirt, a tote bag or backpack, a notebook and marketing materials (posters, flyers), all with clear branding. This start-up kit provides entrepreneurs with the essentials for running a professional, 'recognisable' business. In some communities, Solar Sister also provides the entrepreneurs with a hijab in bright orange,⁴ the colour that is widely associated with Solar Sister. In Nepal, CRT/N provides each of its entrepreneurs with an identity card, which certifies that they have been trained under the WEE-Nepal project.

In addition to demonstrations, one-to-one trust-based selling works well in rural areas. Clean energy products require people to change the way they consume energy and make a relatively substantial investment that will pay off over time. Therefore, traditional ways of selling need to be adjusted. Selling techniques need to respond to a market that has already been spoilt by cheap, but low-quality, clean energy products. This market spoilage has proven to be a major challenge for entrepreneurs in all the countries ENERGINA works in, and it has also been highlighted by a number of previous studies (Koch and Hammond 2013; Bardouille 2012; Pailman 2016; Lighting Africa 2010; ODI *et al.* 2016). One strategy is for neighbourhood/community product demonstrations to be followed up with one-to-one conversations with potential customers. Women entrepreneurs are able to reach out to and hold these conversations with other women who are making the decisions about household energy purchases and are potential clients. In a survey of 362 respondents, 97 per cent of Solar Sister entrepreneurs report selling to women customers, with 32 per cent selling almost exclusively to women (Solar Sister 2016). In all countries, this close relationship with the customers also provides direct real-time customer feedback on the products (also reported in Heuér 2017).

6 Managing the distribution network

Building a reliable supply chain that reaches remote and rural consumers is undoubtedly one of the most challenging aspects of

distribution. In most countries, distributors of energy products have minimal, if any, distribution networks in rural and remote areas. It is as costly and time-consuming to find reliable supply-chain partners offering commercialised products as it is to recruit and retain an effective last-mile salesforce. When products have to be imported, as in many developing countries, import taxes are high, and the importation processes can be difficult and time-consuming (Colenbrander and Miller 2017). Another challenge is that, in response to a growing demand for solar energy products, cheaper, lower-quality, and faulty products have flooded the market. In most cases, the price sensitivity of these markets makes it difficult for entrepreneurs trying to sell good-quality products at a higher price, even though they may be more reliable, certified, and tested. In addition, in rural areas and remote locations the logistics of distribution is difficult: distances are long, road networks are poor, clean energy equipment and technologies may be bulky, and the means of transportation are insufficient and expensive.

Women entrepreneurs are hampered by all of the above realities as well as by societal norms and attitudes that often restrict their mobility, thereby hindering their growth opportunities. Given these challenges, engaging women as part of the distribution chains to reach last-mile areas requires putting efficient systems in place: for transporting technologies and creating trusted points of sale; for ensuring reliable and 'local' repair and maintenance services; and for encouraging a supportive family system that shares some of the entrepreneur's domestic responsibilities and also participates in the business. Women entrepreneurs are generally more successful if their spouses and/or other household members support their activities. This can be in the form of putting money aside to invest in their businesses, using their own network to increase the outreach of the businesses, and helping with the distribution of the products or record-keeping.

From the experience of the WEE programme implementers, it is clear that for seamless distribution of energy products a number of partners need to be engaged, including private sector technology suppliers, transporters, micro-entrepreneurs, sales agents, and producers (especially for some technologies such as *in situ* improved cookstoves). The WEE programme partners utilise existing retail infrastructure where available, including linking with non-governmental organisations (NGOs), community-based organisations, local financing institutions, and women's groups. They also work with international suppliers of high-quality products, complementing their sales forces in distant, remote locations with women-centred door-to-door entrepreneur networks.

At the same time, it works well for women to engage other people in sales, including family members. Given the mobility constraints women face, an effective strategy is a 'relay system' in which the entrepreneur recruits agents or resellers who further distribute the products and are paid a commission on sales by the entrepreneurs, agreed by both parties. In Indonesia, when Ibu Sekeda learned about the Kopernik

programme, she was interested in joining but busy with other work. Consequently, she hired other women from among her friends to sell on her behalf. Kopernik calls these ‘downlines’ and has introduced a downline incentive system to encourage such growth and initiative among entrepreneurs. Similarly, in Nepal, within a relay system, many women work as marketing agents for improved cookstoves in the remote districts. The relay system helps them to be part of the business without having to invest in purchasing inventory. As they gain experience as marketing agents, many gain confidence and start their own businesses employing others. Popularly known as ‘network sales’, this methodology encourages the sales agents to tap into their personal and professional networks to find customers (Zaniewicz 2017). The relay system helps entrepreneurs to increase their sales and, at the same time, creates jobs for other women and young people. The entrepreneurs are able to reach distant markets and a second layer of employment is created for others. For the agents, the main advantage is that they are able to participate in a business and earn an income without having to make an investment in the purchase of product inventory, which many find difficult to do. For the relay system to work well, the following aspects need to be ensured:

- A reliable supply of products, so that orders placed with agents can be met and delivered to the customers in time, otherwise there can be a loss of credibility.
- A pre-agreed system of commission per unit of sale.
- Agents that are fully trained and knowledgeable about the products and aftersales services, in effect as well trained as the entrepreneur herself. This is an additional cost that may have to be built into programmes.

Another effective way of expanding the reach of entrepreneurs is for them to work in groups. In Kenya, many of the women entrepreneurs work in groups of 12–30 members. When working in groups, the entrepreneurs come together for specific tasks such as pooling individual contributions to purchase products and raw materials in bulk, renting a shared space for stocking inventory, sharing transport for bringing products to markets, or sharing the costs of conducting promotional events. All of these enable them to reap economies of scale. In most groups, however, the selling is mostly done on an individual basis, ensuring a ‘business-like orientation’. Group members divide up areas among themselves so that they do not compete with each other. Women say that by buying together they are able to place larger orders, negotiate better prices with suppliers, and transport their inventory in bigger batches. This cuts the cost of transportation and for technologies such as improved stoves and reduces breakages, as the entrepreneurs, when transporting jointly, are able to hire better vehicles to cart their inventory. This is a big gain in rural Kenya where the roads are bad and *boda bodas*⁵ are used to transport fragile equipment such as the ceramic

liners of improved cookstoves. Working in groups also gives women much-needed peer support, both for the business and more generally. Group members support each other, and most groups have set up a small fund that they lend to members in emergency situations at zero interest rate for short durations. When working with groups who will take on distribution functions, it is advisable to ensure that:

- The groups have been in existence for some time and have been engaged in some income-generating activity.
- A savings practice is in place. This helps tremendously: it not only provides some investment capital, but is also an indicator of financial discipline (keeping records of members' savings, maintaining minutes of group meetings, etc.) and basic financial and business management literacy.
- They have set in place systems to ensure all members understand and operate within the given requirements.
- When conducting commonly planned events, all members of the groups are given ample notice so that they can ensure they have enough products for on-the-spot sales.
- Group members understand that contributing towards shared costs is part of giving back to the business to ensure sustainability, as opposed to expecting the project to cover costs.

7 Results of interventions

Utilising the above strategies, the WEE programme supported 4,153 entrepreneurs between 2014 and 2017. These women sold clean energy technologies and fuels (such as fuel-efficient cookstoves, solar lights, and biomass briquettes) to 2,960,756 consumers who previously did not have adequate and affordable energy services (ENERGIA/Hivos 2018). The programme's outcomes are visible at two levels: entrepreneurs and users.

7.1 Programme outcomes for entrepreneurs

Women entrepreneurs set up and operate clean energy enterprises. Data collected across all seven countries showed that in 2017:

- Seventy per cent of the entrepreneurs receiving programme support recorded a consistent growth in profit margin each quarter;
- More than 95 per cent of the entrepreneurs who had taken out loans or consignments had not defaulted on loan repayment instalments;
- Eighty-two per cent of the entrepreneurs were involved in major household purchase decisions; and
- Seventy-two per cent of the entrepreneurs were actively taking business decisions for their enterprises.

When women start working, they often feel empowered and in control of their lives, making decisions in their businesses and in their homes, often together with their husbands or business partners. They may gain greater respect and influence in the household decision-making process. As the entrepreneurs earn additional incomes, they are able to contribute to children's education, health care, clothing, or food. Further, as part of the project, the entrepreneurs acquire skills in sales, pricing, record-keeping, and technical knowledge about how to repair the products – skills that can be transferred to other activities. In fact, most entrepreneurs diversify to include other items in their product range. Finally, they develop confidence and knowledge as they travel to new areas and extend their networks. In the case of CRT/N, in the end-of-project survey, 80 per cent of the entrepreneurs reported making their own decisions in the enterprise; 67 per cent also said they were involved in decision making at the household level, either solely or jointly with their husbands; and 94 per cent of them reported increased confidence in doing business as the most important change they have observed in themselves, while 48 per cent thought it was their increased ability to maintain books and records (some were of the opinion that while the businesses were small, they were able to track inventory and sales without formal account books) (Scott Wilson Nepal 2017).

A majority of these entrepreneurs become role models for other women in their communities, showing that women like them can run successful businesses, and negotiate and advocate for their interests.

7.2 Programme outcomes for users

Through these enterprises, poor and difficult-to-reach populations have gained access to clean energy products and services, such as solar task lights, lamps and home lighting systems, improved cookstoves, and fuel briquettes.

Women entrepreneurs contribute to building new markets for energy products and services and serve customers at the last mile. The WEE experience shows, as has been documented by Bardouille (2012), that when women serve last-mile markets as entrepreneurs, they can contribute to developing new markets and establishing trust. In Tambacounda region in Senegal, Energy 4 Impact has supported 124 women's groups (representing 5,357 women) as energy enterprises in the Energy Opportunities for Women in Senegal project. The end-of-project impact study (Clowes and Benigni 2017) showed that, as compared to the nine control villages in the surrounding areas where the project was not active, in areas where these women enterprises were operating, community members were:

- Willing to pay over 40 per cent more for a solar lamp or an improved cookstove than in other non-project areas;
- Over twice as likely to be able to recall specific benefits of solar lamps or improved cookstoves as compared to other areas; and

- Fourteen times more likely to know where to buy a solar lamp or improved cookstove than those in regions where the project is not active.

A 2017 survey of Solar Sister operations in Tanzania, covering 610 respondents (250 Solar Sister customers and 360 non-customers), showed that the majority of Solar Sister customers are living in communities away from the main highway and hence represent the last mile (MIT-CITE 2018).⁶ The survey also showed that 97.8 per cent of Solar Sister's customers were dependent on kerosene before purchasing a solar product from Solar Sister. Another survey by the Miller Center for Social Entrepreneurship showed that of the customers who purchased solar lanterns, 91.6 per cent no longer used kerosene (Gray, Boyle and Yu 2017).⁷

When they gain access to energy services, users save time and money on fuelwood (through using improved cookstoves) and kerosene (through solar lighting devices). The end-of-project survey in Senegal showed that the households using solar lamps sold by the women entrepreneurs spent a fifth (US\$0.60 per month) of those using grid power for lighting (US\$3.11 per month). Similarly, households using solar lamps or a solar home system used them for more each day (6.2 and 5.4 hours respectively) than those who used grid power for lighting (4.6 hours per day). Those relying on candles and battery-powered devices had the fewest hours of lighting per day (Clowes and Benigni 2017).

8 Lessons in designing programmes for women's energy entrepreneurship

Going beyond specific strategies, this section offers some broader lessons that are relevant for those interested in developing and executing multi-country, multi-partner programmes on women's energy entrepreneurship.

An enabling environment is as important as direct support to the entrepreneurs. Most women's enterprise development interventions are focused on addressing the 'immediate' challenges that women face in starting and expanding a business, and this is an important area. However, larger systemic factors, or the 'enabling environment', play an equally decisive role in shaping the circumstances within which these businesses operate. To improve women's participation in energy value chains, the enabling environment – including policies and resources available – must ensure that structural barriers that create bias against women within policy are overcome. At the same time, the markets and institutional environments in which governments, financiers, energy companies, and consumers operate support such initiatives. Such a conducive, enabling environment is one that includes measures that directly support women's businesses; for example, through improvement in the ease in doing business for women, including streamlined processes for business registration and licensing, easy access to information,

guidance, application submission and follow-up, and easier access to financing (e.g. not requiring husbands to sign onto bank accounts/loans).

An ecosystems approach based on partnerships is central to women's enterprise development. An energy access ecosystem has been defined as an

interconnected network of organisations working on the supply of modern energy services to poor people. From national governments, donors, utilities and businesses, to NGOs, civil society, community groups, and individual consumers, all of these actors have a crucial role to play in creating universal energy access. No single entity can do this alone. Indeed, these organisations are interconnected and their success is linked both to each other and the system as a whole (Practical Action 2012: xi).

In promoting women's enterprise development, a number of stakeholders need to operate in conjunction: entrepreneurs, specialised support organisations, financial institutions, civil society organisations (e.g. women 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 the value chains as a whole. Multi-stakeholder partnerships also help harness knowledge and interorganisational learning, for pooling resources and capabilities, for navigating bureaucracy and accessing finance, and for promoting the enterprise's added value to customers, donors, and the wider community (Bymolt *et al.* 2015).

For the WEE programme, such collaborations helped the partners fill gaps in capacities; they also enabled scale and speed and, most importantly, brought fresh perspectives into the thinking. When a range of actors work together, they can sustainably bring about the changes in attitudes, practice, and policy necessary to support women's energy entrepreneurship. The range includes:

- The entrepreneurs, who bring energy products and services to last-mile communities. They also play a crucial role in increasing awareness concerning energy and environment issues and about available options.
- Clean energy product suppliers, who benefit from increased distribution, sales, and aftersales service networks as a result of their ability to extend credit to enterprises and to final consumers.
- Banks, microfinance institutions, cooperatives, and village savings and loan associations, which extend credit to a pipeline of potential clients (investment-ready women entrepreneurs, equipment suppliers).

- National government agencies and local authorities, which set the policy environment and the regulatory framework in which women's energy businesses have to operate, including issues related to taxes on energy products and quality assurance.

In programming, aggregation of efforts is an important function.

ENERGIA and the WEE implementation partners played this role on multiple levels. In approaching local financial institutions, the partners aggregated demand for credit from a number of entrepreneurs, making it a viable packet for the financial institution; they also aggregated demand for energy products when approaching product suppliers, thereby negotiating better prices. For ENERGIJA, aggregating the services provided to its partners enabled it to optimise resources significantly. At the same time, aggregating the collective experience of its partners enabled it to generate credible evidence and data from the field, which has been useful for global advocacy.

9 Conclusions

In the energy access space, women's entrepreneurship will increasingly matter in the years to come, for communities, for businesses and the private sector, and for governments. Globally, several bilateral and multilateral donors are prioritising women's economic empowerment. Increasing the role of women in the economy is viewed globally as critical for economic resilience and growth (OECD 2010). Women's economic participation, and their ownership and control of productive assets, is reported to speed up development, help overcome poverty, and reduce inequalities.

While the reality is that women continue to face obstacles as entrepreneurs, there are now a number of organisations and businesses working with women in the energy sector. As a result, there is an emerging body of documentation around lessons and successful approaches for promoting women's access to finance, training, and markets in energy businesses. The WEE programme experience with supporting women's entrepreneurship in clean energy indicates that such approaches that keep women at the centre of the business models are not only workable, but have a significant role to play in the distribution and uptake of clean energy products and services at a large scale.

This article has highlighted the key challenges experienced by women's enterprises working in the clean energy sector, and has provided a set of possible solutions to address these. Clearly, each market is unique, as is each woman, and women entrepreneurs' demands are not universal; instead, they need customised solutions. While women still face obstacles to establishing and growing their businesses, there is a growing number of approaches to promote them as entrepreneurs in the energy space. Building on available experience and expertise, both public- and private-sector players have an opportunity to collaborate in order to bring these initiatives to scale.

Notes

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- 1 Soma Dutta, Senior Technical Advisor, ENERGIA, International Network on Gender and Sustainable Energy, hosted by Hivos Foundation, The Netherlands
 - 2 In this article, productive use of energy is used to mean ‘utilisation of energy – both electric, and non-electric energy in the forms of heat or mechanical energy – for activities that enhance income and welfare’ (Kapadia 2004).
 - 3 In late 2016, Solar Sister’s operations in Uganda were wound up.
 - 4 A hijab is a veil, usually covering the head and chest, worn by some Muslim women in the presence of any male outside of their immediate family.
 - 5 *Boda bodas* are bicycle and motorcycle taxis commonly found in East Africa.
 - 6 In 2017, with the support of the US State Department’s wPOWER programme, Solar Sister partnered MIT’s Comprehensive Initiative on Technology Evaluation to study last-mile customer preferences and evaluate the reach of Solar Sister’s women-centred distribution chain. MIT conducted over 600 interviews in Tanzania with both Solar Sister customers and non-customers, resulting in the report *Reaching the Last-Mile: Women’s Social and Sustainable Energy Entrepreneurship* (MIT-CITE 2018). The study created a customised framework to evaluate the ‘last-mileness’ of interviewees. MIT combined poverty level, grid access and remoteness to form a Last Mile Index (LMI).
 - 7 In June 2017, the Miller Center for Social Entrepreneurship conducted action research to study the social and material impact of Solar Sister’s model on end customers. The report, *Turning on the Lights: Transcending Energy Poverty Through the Power of Women Entrepreneurs* (Gray *et al.* 2017), assessed the impact of solar lanterns on education, health, productivity, finances and women’s economic and social empowerment. Sample size: 257.

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