

# ENE425 Sustainable Energy and App Development

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## Chapter 12

# Sustainable development. Sustainable Development Goal 5: Gender Equality

### 12.1 Introduction

In this chapter we study the relation between three different sustainable development goals: Sustainable Development Goal 5: Gender Equality; Sustainable Development Goal 7: Affordable and Clean Energy; and Sustainable Development Goal 8: Decent Work and Economic Growth.

The chapter is organized as follows:

1. **Background**
2. Women in renewable energy: **Modern energy context**
  - a. Status and trends
  - b. Barriers to entry
  - c. Retention and career advancement challenges
  - d. Policies and solutions
3. Women in renewable energy: **Access content**
  - a. Status and trends
  - b. Barriers and challenges
  - c. Policies and solutions

This chapter is based on the document "Renewable energy: A gender perspective."

### 12.2 Background

IRENA estimates that the number of jobs in the renewable energy sector could increase from 10.3 million in 2017 to nearly 29 million in 2050. The sector offers diverse opportunities along the value chain, requiring different skill sets and talents.

In that context, increased women's engagement expands the **talent pool** for the renewables sector. Meanwhile, greater gender diversity also brings substantial co-benefits. Studies suggest that women bring **new perspectives to the workplace** and **improve collaboration**, while increasing the number of qualified women in an organisation's leadership yields **better performance overall**. In the context of energy access, engaging women as active agents in deploying

off-grid renewable energy solutions is known to improve sustainability and gender outcomes.

The document "Renewable Energy: A Gender Perspective" (2019) aims to address this knowledge gap. It analyses the status of women's participation in the sector in two distinct deployment settings – **the modern context** (in which renewables displace or complement conventional energy) and **the energy access** context (which is characterised by efforts to expand access to modern energy services).

## 12.3 Women in renewable energy: Modern energy context

### 12.3.1 Status and trends

While it is true that renewable energy is subject to some of the same limitations and barriers that prevail in the energy sector at large, this report shows that **women already have a stronger presence in renewable energy than is the case in fossil fuels**. Furthermore, renewable energy offers a range of unprecedented opportunities. As a young and dynamic sector, it is open to change in ways that are harder to effect in an industry as set in its ways as the relatively mature fossil fuel sector. In the unfolding energy transition, women will have the chance to garner a growing share of employment.

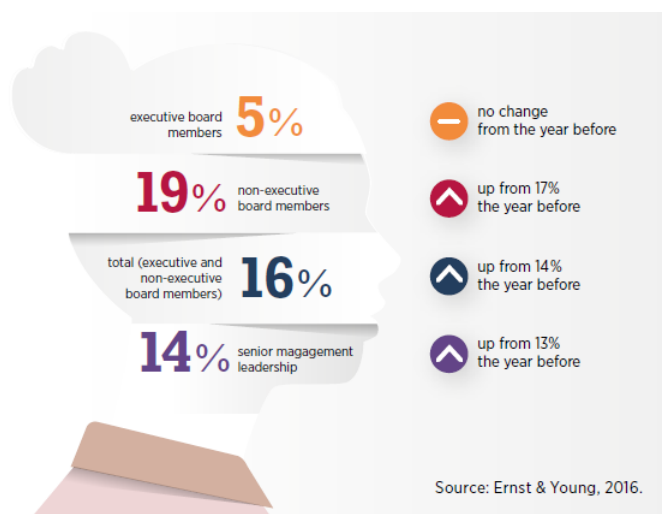
A better gender balance is not a zero-sum game in which women stand to gain while men lose. Studies have shown that an increase in the number of qualified women in an organisation's leadership yields **better performance overall** (Noland et al., 2016). Women are also likely to bring **new perspectives** into their work, are more likely to **act collaboratively** in the workplace and may contribute to **greater fairness** (Moodley et al., 2016). A better gender balance in male-dominated professions has been shown to contribute to the **improvement of working conditions** for both men and women, with positive effects on **well-being, work culture and productivity** (WISE, 2017).

## 1. Employment in renewable energy, gender related findings

Available information strongly indicates that employment in the conventional energy industry is male dominated:

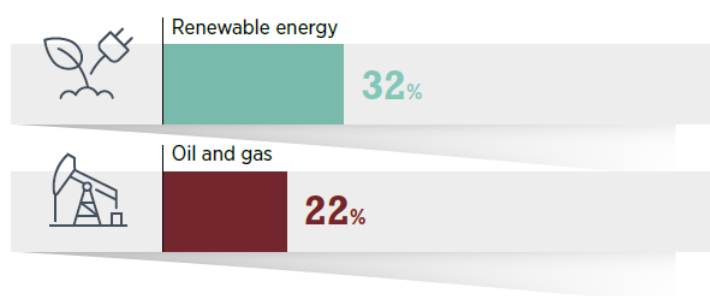
1. A 2017 study by the World Petroleum Council and Boston Consulting Group put **the share of women in the worldwide oil and gas workforce at 22%** – much lower than in manufacturing, finance, education, health and social work, and lower than the average in the overall workforce. **While women fill 27% of entry-level jobs** in the oil-and-gas sector that require a college degree and **25% of midcareer-level jobs**, their share is only **17% in senior and executive roles**. **Only one in a hundred CEOs in the sector is a woman** (Rick et al., 2017).
2. In 2015, the electricity, gas and water supply sector was found to have women in **22%** of senior management roles, roughly half the share in the educational and social services sector (McCarthy, 2016).
3. A study of the world's **200 largest utilities** found only 25 female board members, representing 16% of board members, and only 5% of executive board members (Ernst and Young, 2016) (figure 12.1).

Figure 12.1: Female board members at 200 of the world's largest utilities, 2016



Source: IRENA (2019)

Figure 12.2: Share of female full-time workforce in renewable energy and oil and gas



Source: IRENA (2019)

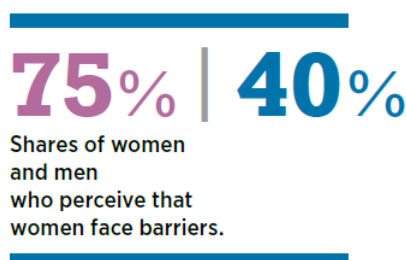
## 2. Gender composition of the workforce in the renewable energy sector

Studies to date confirm that women are also under-represented in the renewable energy sector. Reports from countries such as Canada, Germany, Italy, Spain and the United States suggest that typically less than 30% of jobs in the **renewable energy sector** are held by women (figure: 12.2). Women are more likely to be employed in lower paid, non-technical, administrative and public relations positions than in technical, managerial or policy making positions. This contrasts sharply with the fact that **women represent more than 50% of university students**, and **almost half the labour force in these countries**.

### 12.3.2 Barriers to entry

Almost two-thirds of all respondents think that women face some barriers to access to renewable energy works. However, this result is strongly driven by female respondents, three quarters of whom answered in the affirmative. By contrast, only 40% of male survey participants agreed (figure 12.3).

Figure 12.3: Shares of women and men who perceive that women face barriers



Source: IRENA (2019)

## 1. Perceptions of gender roles

Self-perception by women themselves and in part a set of assumptions among men about women's ability to succeed. Both are well-recognised in the literature as key impediments to women's hiring and advancement in certain careers in the energy industry and other sectors.

In a review of technical education for women in 120 countries, social, cultural and gender norms and misperceptions were identified as factors that erode girls' confidence, interest and willingness to engage in STEM (Science, technology, engineering and mathematics) subjects (UNESCO, 2017). Girls are often brought up to believe that STEM subjects are "masculine" topics and that women's ability is innately inferior to that of men.

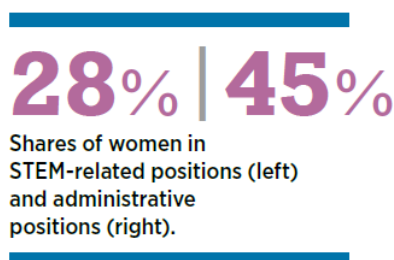
Despite concerted efforts over many years to address the gender imbalance in these fields, only 12% of engineers in the United Kingdom are women, compared with 47% of the overall workforce. Between 2015 and 2016, just 16% of those who started an engineering or technology degree in the United Kingdom were women, and only 25% of girls aged 16–19 said in a survey they would ever consider a career in engineering. Similar barriers of perception or interest have been identified in Australia, Belgium, Finland, Poland, Spain and Sweden (OECD Higher Education Programme, 2014).

## 2. Women's participation in STEM fields and misperceptions of career pathways

Driven by perceptions and misperceptions, only a low percentage of female students choose the STEM fields. The latest edition of the UNESCO Science Report, entitled Towards 2030 (UNESCO, 2015), offers the most recent statistics on women's participation in STEM fields. The share of women graduating in the fields of engineering, physics, mathematics and computer science is low in many industrialised countries. The roughly 20% share of women among engineering graduates in Canada, Finland, Germany and the United States is rather typical. In Japan and the Republic of Korea, women represent an even lower proportion – just 5% and 10% of engineers, respectively. There are some bright spots, however. In Cyprus and in the United Arab Emirates (UAE) women represent 50% of engineering graduates, in Denmark 38%, and in the Russian Federation 36%.

Gender imbalances among STEM students carry through to gender imbalances in STEM jobs in the renewable energy sector as elsewhere. IRENA's survey finds that women occupy 28% of STEM positions. While these percentages are close to the average share of 32% across the entire workforce, they are much lower than in administrative jobs (figure 12.4).

Figure 12.4: Shares of women in STEM-related positions (left) and administrative positions (right)



Source: IRENA (2019)

### 3. Lack of career information

An enduring disadvantage that women and girls face in comparison to their male counterparts is the lack of readily **accessible information about employment in non-traditional occupations**, including those in the energy sector. Personal networks are critical for entering and succeeding in many professions. But women have more difficulty accessing such networks on par with men in non traditional occupations and thus are at a disadvantage in receiving timely information about job openings (UNESCO, 2015).

**Careers in renewables are generally still not promoted through formal channels** such as career counsellors, student employment advisors, job centres, recruitment sessions and career fairs.

Because technical fields of study have been dominated by men for so long, a significant amount of information about job opportunities continues to travel through familial and **professional networks that often are inaccessible to women**.

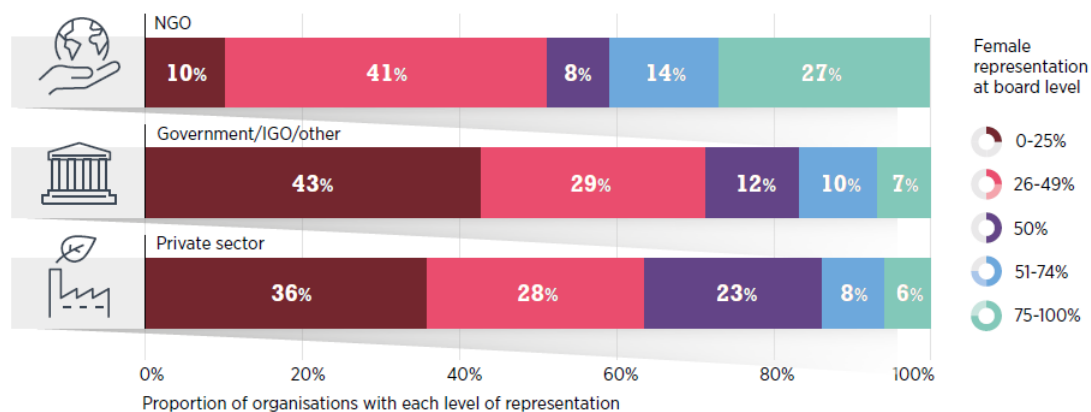
### 4. Prevailing hiring practices and unequal access to career entry points

The literature on employment in the conventional energy sector and other non-traditional occupations such as mining and transportation confirms that men tend to apply for jobs even when they meet only some of the requirements, but **women tend not to apply for jobs unless they meet all requirements**. Women are also **less likely to negotiate salaries and benefits**. They must often outperform men in male-dominated industries just to fit in and certainly to progress.

In the countries of the Organisation for Economic Co-operation and Development (OECD), such as the United Kingdom, where women comprise 94% of childcare apprentices but under 4% of engineering trainees. Trades associated with energy industry occupations (wind turbine technician, solar energy system installer, electrician, energy auditor, energy retrofitter, etc.) remain heavily male-dominated. In Ireland, just 1% of apprentices in engineering and construction were women.

In most countries, securing a trade apprenticeship remains an unregulated process, with informal networking still the norm. This often translates into a barrier to women's entry into and advancement in these fields.

Figure 12.5: Gender composition of board of directors in the renewable energy sector



Source: IRENA (2019)

### 12.3.3 Retention and career advancement challenges

The key issues that condition and limit women's renewable energy careers include:

1. The **glass ceiling**.
2. **Mobility-related challenges** and **difficult work schedules**.
3. **Wage inequalities**.

#### 1. The glass ceiling

All along the renewable energy value chain one finds persistent barriers to improving women's representation in senior executive positions and on boards of directors. The **lack of equal representation of women in decision-making roles is described as the "glass ceiling"**, where invisible barriers keep women from rising to influential positions, regardless of their qualifications.

A recent McKinsey survey in the United States, for example, shows that the higher up the corporate ladder one moves, the fewer women one finds. For entry-level positions, women accounted for 48% of jobs. Among managers and senior managers, the share declined to 39% and 34%, respectively; for vice presidents, it was 30%, but for senior vice presidents and executive-suite positions, it was only 23%.

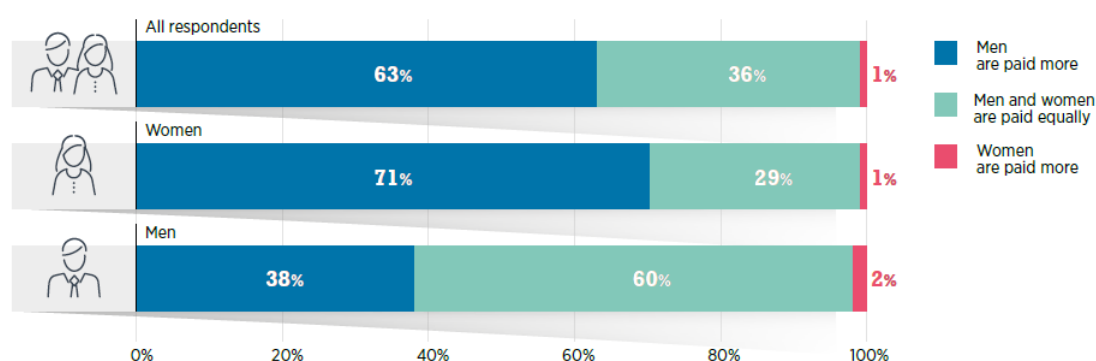
IRENA's survey provides evidence for different types of organisations working in the renewable energy sector. Survey responses indicate that men account for a majority of board members at 65% of participating private sector firms. In close to half of all firms, men represent at least three-quarters of directors. The distribution is also heavily male biased among national agencies and intergovernmental organisations in the sample, although almost a quarter of them have equal representation between the genders. In comparison, non-governmental organisations have a much better gender balance (figure 12.5).

#### 2. Work schedules and mobility requirements

**Rigid work schedules** were identified by survey respondents as one of the key barriers women face, given that, in many societies, they are expected not only to excel at work but also to reliably perform many tasks outside of work, including child rearing, other care-giving responsibilities and various household chores. "Having it all" is especially difficult when there is little flexibility



Figure 12.6: Beliefs about pay equity among men and women



Source: IRENA (2019)

at work.

**An added burden is found in mobility requirements**, particularly among those in the renewable energy sector who hold field jobs (project planners, installers, operators) and may thus be subject to frequent travel requirements, relocation and long periods of time away from home and family. While this can be challenging for men and women alike, women with care-giving responsibilities, especially for young children, face a particular disadvantage.

However, one must not assume that women would prefer not to hold such jobs. Many women already work in less-than-optimal environments, and for much less pay than they could make in renewables. Given the option, some women may prefer work in renewable energy simply because of the potential to earn higher wages. Because of persistent male-biased norms (often unintended or unconscious), even women who are able and willing to work may not be given the option to choose between difficult or dangerous working conditions with low pay and similar conditions with higher pay. Instead, women are tracked into feminised occupations in administrative and support services within the sector.

Assumptions about women's willingness or ability to work in certain occupations or working conditions can thus themselves become barriers to women's employment.

### 3. Wage inequities

Existing research on women's employment in renewable energy in OECD countries reveals that although average wages in the industry may be higher than in other sectors, **women continue to earn less than men across occupational categories**.

Close to two-thirds of IRENA survey respondents believe that women in renewable energy earn less than men for the same position, while one-third believe they earn the same, and just 1% believe women are paid more (figure 12.6). But the survey also indicates that perceptions about wage equity are strongly shaped by a gender bias. Among male respondents, just 37% say they think men are paid more, as opposed to 70% of female respondents. Some 60% of men have the perception that both genders are paid equally.

As in other sectors, the causes of the gender wage gap in renewable energy appear to be multifaceted. They include women's greater concentration in lower-paying, non-technical and administrative jobs and in junior positions; women's comparatively weaker negotiating positions; their greater likelihood of taking time off from their careers for parenting and care-giving; and

the attitudes and values of employers. In addition, differences may in some cases be the result of pay discrimination.

### 12.3.4 Policies and solutions

#### 1. Mainstreaming gender perspectives

To promote gender equality in renewable energy employment, it is important to assess whether gender perspectives enter into decision making. Gender audits can help answer this question in the context of public policy measures such as legislation and regulations, and in the private sector.

A **gender audit** is one aspect of what is referred to as “mainstreaming”: analysing legislation, regulations, taxation and specific projects for their effect on the status of women in society. **The basic assumption of gender audits is that public policy affects men and women differentially, stemming from the different roles women and men in the family and their status in the economy.** They are essential for constructing more gender-sensitive policy frameworks, for providing support services and other incentives to increase gender equity, and ultimately for increasing gender equality. **Gender audits of energy sector policy have been implemented in several developing countries, mainly with support from ENERGIA, the International Network on Gender and Sustainable Energy.**

#### 2. Creating networks and supporting mentorship

Women are often effectively excluded from access to familial and professional networks that provide information about job openings and career opportunities. **Many of these networks have traditionally catered to the interests of men.** There is an urgent need to level the playing field by improving women’s access to such information and peer support. A measure the renewable energy industry could undertake is to “simulate” valuable personal connections through practices such as **mentoring programmes, outreach efforts, site tours and temporary work placements.**

**Organisations** advocating for greater gender equity in the renewable energy sector are already pursuing such strategies. They share information; create networks among representatives of government, industry, academia and non-profit groups; and offer mentoring, coaching and consulting services (figure 12.7; boxes below).

Figure 12.7: Selected organisations advocating for gender equity in renewable energy

Name	Year founded	Location of activity	Activities
<b>ENERGIA</b> (International Network on Gender and Sustainable Energy)	1996	22 African and Asian countries	Gender mainstreaming, strengthening women-led energy enterprises, advocacy
<b>WRISE</b> (Women of Renewable Industries and Sustainable Energy)	2005 <sup>a</sup>	United States	Fellowships, awards, webinars, networking, training retreats, in-person and online mentoring
<b>Hypatia</b>	2010	Germany	Networking, events
<b>WISE</b> (Women in Solar Energy)	2011	United States	Education, capacity building, advocacy, strategic partnerships, networking, events
<b>WICS</b> (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)
<b>WIRE</b> (Women in Renewable Energy)	2013	Worldwide	Capacity-building field trips, networking, awards recognition programmes, student bursaries, speed mentoring
<b>Women in Sustainability, Environment and Renewable Energy (WiSER)</b>	2015	United Arab Emirates	Advocacy, education and training opportunities for women, platforms for dialogue, showcasing of women's contributions to sustainability
<b>Renewable energy and energy efficiency Women's Network (REDMEREE)</b>	2016	Mexico	Networking, capacity building, training and events
<b>Women in Sustainability (WiS)</b>	2017	India	Advocacy, networking
<b>GWNET</b> (Global Women's Network for the Energy Transition)	2017	Worldwide	Interdisciplinary networking, advocacy, training, coaching and mentoring, and services related to projects and financing
<b>Nordic Energy Equality Network (NEEN)</b>	2017	Nordic and Baltic countries	Bringing together people who are interested in improving gender balance and promoting diversity in energy-related matters

Source: IRENA (2019)

#### GWNET: Offering online mentoring

The Global Women's Network for the Energy Transition (GWNET) began in early 2018 to offer a global **online mentoring programme for women** in junior and middle-management positions.

**The 12-month cycle** emphasises suitable match-ups between mentors and mentees. Participants in the 2018 cycle – mentees and mentors – hail from Africa, China, Europe and the Middle East, as well as North and Latin America.

The programme is set up to **run remotely**; however, several mentees have managed to meet with their mentors in person. Each duo establishes an agreement on the frequency of interactions and the mode of communication.

Beside the bilateral interaction, mentees have access to tailored knowledge **webinars** to assist in personal and professional growth. Webinars focus on the development of the energy sector, women's entrepreneurship and personal development. The programme concludes with an **interactive web-based graduation meeting**.

### The Pink to Green Toolkit: Wider Opportunities for Women

Wider Opportunities for Women advocates for gender equity in employment in the United States. Its Pink to Green Toolkit includes **presentations, trainings, webinars, curriculum guides and modules, briefs, templates, tip sheets**, and planning documents designed to maximise capacity building in recruiting, assessing, placing and retaining women in green occupations.

The toolkit is organised into **five categories**: outreach and recruitment of women, assessment and case management for women, building critical skills of job readiness, gender-inclusive and gender-focused training design, and sexual harassment.

The **resources** in the toolkit include a myths-and-facts worksheet about common stereotypes, presentations about the benefits of green jobs for women, an assessment of a company's or organisation's capacity to serve and recruit women, a tip sheet to plan a career fair, a module on building skill and confidence of women to perform well in interviews, modules addressing communication and learning styles of women, and many more.

The toolkit can be a valuable resource for organisations working on equity in renewable energy and the broader green economy in other countries.

A range of **measures can help create greater awareness of career opportunities**, including:

1. Ensuring that information about renewable energy jobs and careers is **publicly available** through online bulletin boards and other measures.
2. Supporting the establishment of **mentorship programmes**.
3. Working with educational institutions to reach out to women by publicising **training opportunities**, including **apprenticeships**.

New job entrants can be inspired by, and learn from, those women who already have established a career in the sector. Showcasing their accomplishments not only recognises their trail-blazing work, but also highlights opportunities for women joining the renewable energy workforce. Several **dedicated awards** have been instituted to recognise women's accomplishments in the renewable energy sector (boxes below).

#### C3E Women of Distinction Award

The Clean Energy Education and Empowerment (C3E) Initiative was launched in 2010 by the Clean Energy Ministerial, a global consortium with representation from 24 countries.

The C3E initiative seeks to increase women's participation and leadership in clean energy, especially in the **STEM fields**.

The US C3E programme, initiated in 2012, is led by the **US Department of Energy** and **three university partners**: the MIT Energy Initiative, the Stanford Precourt Institute for Energy, and the Texas A&M Energy Institute.

Among its **pillars** of activity are an annual symposium that provides networking opportunities for professional women, students and government representatives, and awards for outstanding mid-career women in education, research, business, entrepreneurship, advocacy, government, law and finance, among others.

#### WiRE Women of Distinction Award

Woman in Energy Renewable (WiRE) was launched in 2013 in Canada and is now active internationally.

To advance the role and recognition of women in the renewable energy sector, it **offers** mentoring, provides networking opportunities in partnership with government agencies and renewable energy associations, and organises capacity-building field trips.

WiRE supports the Leadership Accord for Gender Diversity in Canada's Electricity Sector, a 2017 commitment by employers, educators, unions and governments to increase the representation of women in the electricity and renewable energy sectors.

WiRE also supports the **Equal by 30 Campaign** for equal pay, equal leadership and equal opportunities for women by 2030.

The organisation presents a "**WiRE Woman of the Year**" award, plus "**Woman of Distinction**" awards in the solar, wind and hydropower sectors.

**The awards recognise accomplishments in a variety of areas**, including leadership, policy and advocacy, technical advancement and R&D, project development, community adoption of renewable energy technologies, and contributing to the advancement of women in the energy sector by volunteering or serving as a role model.

### **3. Access to education and training**

#### **1. University curricula** can be adapted to be more open to women.

- At the University of California, **Berkeley**, 2014 was the first year that more women than men enrolled in an introductory computer science course. An important factor was that the curriculum had begun to **emphasise group projects and creative thinking in addition to programming**.
- At the Massachusetts Institute of Technology, female enrolment in the Department of Electrical Engineering and Computer Science doubled between 2011 and 2017 and the

share of female majors rose from 30% to 38%. In parallel, the institution's Department of Mechanical Engineering has seen sustained female major enrolment rates of more than 40% over the past five years. In both departments the number of female students increased markedly following **changes in the curriculum, content and pedagogy**. The most rapid period of growth in female students also coincided with the **department being headed for the first time by a woman**.

## 2. Scholarships, internships and enrolment targets can attract women into clean energy careers.

- Supported by several governments, the **C3E initiative** provides opportunities for scholarships, internships and academic and industry research appointments.
- Another example is the Women in Science Initiative established at **King's College London** in 2013 to address the imbalance of women working and studying in STEM fields. The initiative established Women in Science Scholarships for undergraduates in mathematics, physics, computer science and chemistry. Further, a gender equality student fund was established to support innovative projects, activities and events that promote gender equality in STEM.

## 3. It is also important to widen **opportunities for women in vocational training**.

- An application scorecard developed by the **South African Renewable Energy Technology Centre**, for example, allocates double points for female applicants.
- In Kenya, the **Strathmore Energy Research Centre (SERC)** has conducted training courses for solar PV technicians with the express purpose of enlarging the pool of female solar PV technicians.

## 4. Gender targets and quotas

**Numerical goals for gender diversity and equity can be an important indicator of progress.** They include targets for recruitment of new staff, as well as greater gender balance in the overall workforce. For example:

- **Engineers Canada** adopted its “30-by-30” programme in 2011 to raise the number of newly licensed female engineers in Canada to 30% by 2030.
- In 2017, **Engineers Australia** announced a target to have women make up 30% of its 100 000 member organisation by 2020.
- A McKinsey review of 118 US companies and 30 000 employees found that **companies with gender targets made the most tangible progress toward gender balance and equity, while those without targets lost ground**.

Several **OECD countries** have adopted nationwide **goals or targets** to increase the number of women in engineering and technical fields. **Countries that have instituted mandatory quotas have achieved a higher level of representation of women in the boardroom, and done so more rapidly, than countries that have opted instead to encourage gender diversity via a “comply or explain” approach**, which requires them to adopt mechanisms that consider the representation of women or explain the reason for not doing so. Some examples:

- In **France**, for example, women held 37.6% of the board seats at companies surveyed in 2016 by Morgan Stanley Capital International, representing substantial progress toward the country's mandatory 40% quota to be met by 2017.

- In **Germany**, which has implemented a quota of 30% by 2017, women held 26.7% of board seats in 2016.
- In **Norway**, which requires that women make up 40% of the board, 39% of the board seats were held by women.

## 5. Workplace practices, policies and regulations

To actually achieve a **better gender balance** in the workplace requires careful **implementation**:

1. Fair and transparent internal processes governing **employee appraisal and promotion**, and establishment of **appropriate systems to measure and track progress**.
2. **Mentorship programmes** can help make the workplace more welcoming to women and supportive of their career development by helping them to overcome hesitations in the face of traditional perceptions and stereotypes and, once hired, allowing them to thrive with the support of experienced colleagues and peers.
3. Understanding and addressing **wage gaps** is another important issue. This chapter has already pointed to the perception of inequities. To some extent, wage differentials reflect the general gender bias in the workforce structure, i.e., women predominantly occupying non-technical and lower paid positions. However, there is also a need to ensure that **equal work receives equal pay**.
4. All publicly and privately held renewable energy employers should be encouraged to adopt policies to make **wage information more transparent**. Even anonymised salary data grouped by qualifications, skills and years of experience would enable applicants to understand what fair salaries are like at specific career stages.

All entry-level workers should be able to understand the **career trajectories** and possibilities for advancement specific to their sector. This would help level the playing field for women who, as explained earlier, are more likely to lack the familial and social connections that often provide men with information about **career and salary trajectories**.

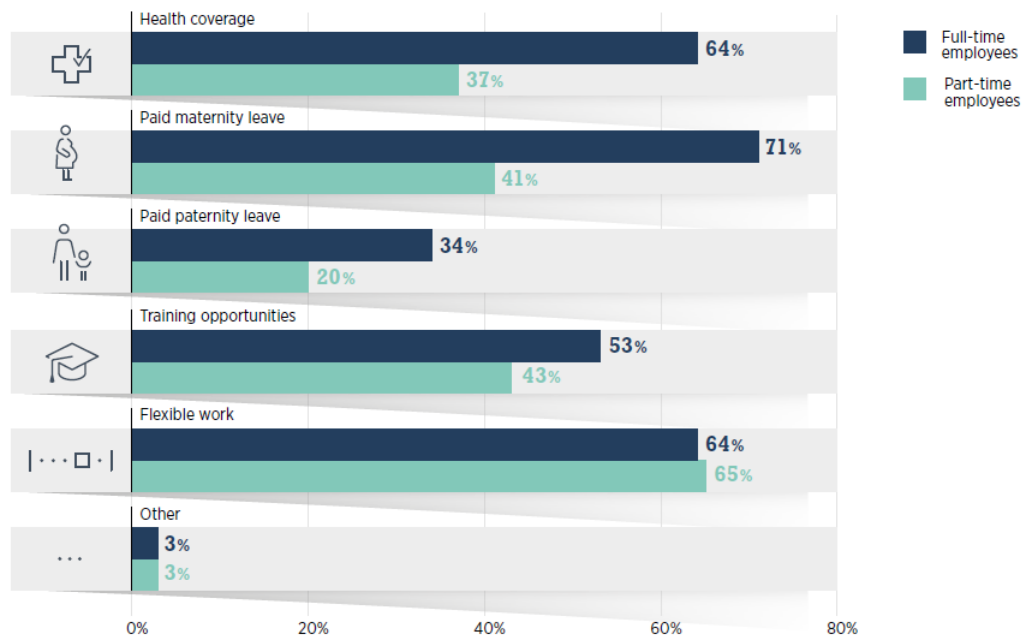
## 6. Work-life balance

1. **Part-time employment, flexi-time and job-sharing arrangements** can, in principle, provide a degree of “time sovereignty” to female workers, making it easier for them to enter and remain in the labour force. Both part-time and flexi-time arrangements are among the most-favoured options among survey respondents. By contrast, job sharing was ranked low among options already offered in workplaces and in the list of measures desired by respondents.

The survey shows that 63% of all organisations participating in the survey offer part-time work and survey participants indicated that this can be important in reducing gender barriers. Availability varies. While NGOs score highest at 84%, only 40% of governments and IGOs allow part-time work (or similar measures such as working from home and flexi-time). Private sector companies perform better than public sector entities, with an average of 62%. Survey results confirm that the availability of part-time slightly increases the share of women in the workforce. Compared with their 32% share of full-time employment, women account for 36% of part-time workers. However, part-time work offers less work and social benefits (figure 12.8).

2. **Adequate paid parental leave policies** can help to ensure that women do not incur unfair disadvantages from childbirth and child-rearing. Such leave should not be limited to

Figure 12.8: Comparison of benefits among full- and part-time employees



Source: IRENA (2019)

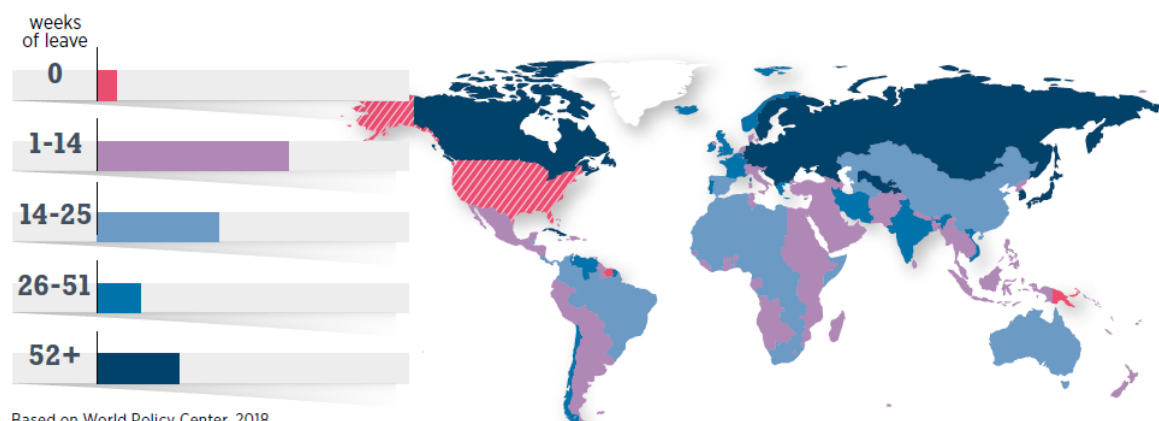
women; **paternal leave can help parents** share the burden of child rearing. But such policies need to be coupled with public policy measures or corporate undertakings to allow women (and men) to resume the positions they held previously without sidelining their career prospects. In addition, on-site childcare facilities can provide a good transition back to the workplace after a period of parental leave.

Policies vary widely among different countries and regions. Corporate practices may in many cases merely reflect local legal requirements. As of 2014, a total of 83 countries offer paid maternity leave of up to 14 weeks; another 53 provide 14-25 weeks, 18 offer 26-51 weeks, while 36 offer 52 weeks or more (figure 12.9). Some 70 countries worldwide also offer paid paternity leave.

By sharp contrast, the United States is one of just nine countries worldwide that have no legal requirement of paid maternity leave at all. In those countries, private executives decide how hospitable their workplace will be to women.



Figure 12.9: Paid maternal leave, in weeks



Source: IRENA (2019)

#### Definitions of part-time work, flexi-time, and job-sharing

**Part-time work** is usually defined as a specific number of work hours that make up less than a full work week, but the threshold varies among countries. The specific distribution of work hours across a week, month or year can vary strongly. The share of part-time workers in overall employment has generally increased in developed countries but remains low in most developing countries. **Women are believed to represent close to 60% of all part-time workers, a much higher portion than their share of the total workforce.**

**Flexi-time (also called flex-time)** is a system in which people work a set number of hours within a given period, but the starting and finishing times are chosen by the employee within agreed limits (e.g., core working hours are not subject to flexi-time arrangements). Pay and benefits should in principle be unaffected, since there is no net reduction of working hours.

**Job sharing** is an arrangement under which two people voluntarily share the responsibilities of one full time job. The individuals involved work as a team to complete a given task and share responsibility for the overall workload. Job sharing may involve people working half days, alternate days or alternate weeks. Total working hours are typically divided equally among job sharers, who receive salary and benefits on pro-rata basis.

## 12.4 Women in renewable energy: Access context

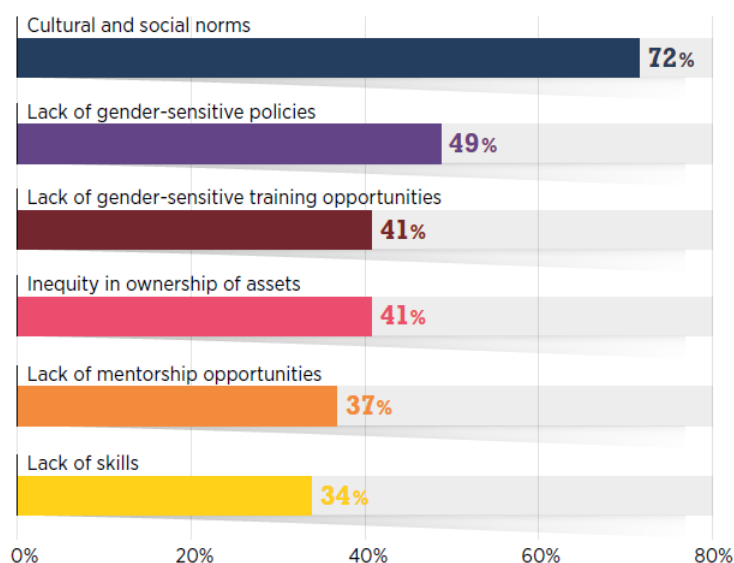
### 12.4.1 Background

Globally, the number of **people without access to electricity fell below 1 billion** for the first time in 2016. The number without access to clean cooking facilities has been gradually declining, but still accounted for nearly 3 billion globally in 2016 (World Bank, 2018).

The lack of access to modern energy **affects women and children disproportionately**. A large amount of their time and labour is spent on unpaid care work, subsistence and productive tasks (e.g., **gathering fuelwood for cooking, fetching water, manually processing grain or other food**) (World Bank, 2017).

Figure 12.10: Barriers to women's participation in deploying renewables to expand energy access

**Figure 3.3** Barriers to women's participation in deploying renewables to expand energy access



Source: IRENA online gender survey, 2018.

Note: Respondents were asked to select three barriers to women's engagement in deploying renewables to expand energy access. The percentages represent the share of respondents who selected a specific measure as one of their top three.

Source: IRENA (2019)

**Indoor air pollution** resulting from the use of traditional fuels for cooking and limitations on the delivery of healthcare, education, water and other basic public services owing to the lack of modern energy also has a far greater impact on women and children than on men.

Access to affordable, reliable and sustainable modern energy can have a transformative **impact on productivity, incomes and overall well-being**. It frees up time for women collecting fuelwood and enables time-shifting of tasks with access to lighting, opening new opportunities for leisure, part time work and income-generating activities. There are also strong cross cutting links to other sectors, including improved education opportunities for girls, safety, and access to media.

This chapter focuses on the gender dimension in the deployment of **off grid renewable energy solutions** for improving access to modern energy.

### 12.4.2 Barriers and challenges

Over **two-thirds (66%) of survey respondents** stated their belief that women working or seeking work in expanding access through renewable energy faced **barriers**.

The barriers were associated with several factors. Cultural and social norms were cited by respondents as the most common barrier to women's participation in the access sector, followed by lack of gender-sensitive policies and training opportunities and inequity in ownership of assets (figure 12.10). Security and the remoteness of field locations were also mentioned as other barriers to women's participation.

## 1. Cultural and social norms

The gender division of labour results in women allotting a significant amount of their time to **household work and childcare (and elderly care)** responsibilities, and consequently having **limited skills and time to engage in formal, paid activities** that predominantly employ men (SEforAll, 2018). In some cases, **women (and children)** spend on average 1.4 hours a day collecting solid fuels and several hours cooking with inefficient stoves, leaving them less time to pursue other economic, family or leisure activities (UN Women, 2018).

Women also tend to have **less access to information, skills, training and labour markets, while facing greater risks of violence**. This **influences their decision-making power** and exercise of voice and agency, and constrains their access to land and productive resources, technology and information, and education and health services.

Cultural and social norms and power hierarchies strongly influence women's ability to participate in energy access programmes. As an example, **women are often disadvantaged in gaining access to energy by the fact that men typically make the purchasing decisions within the household**. Since kerosene, diesel and other fossil fuels tend to be expensive, men are often more willing to purchase or seek financing for technologies such as solar lighting systems that can save money (and are perceived to be beneficial for the entire family) than technologies such as clean cookstoves that reduce women's drudgery and "time poverty".

Understanding how **intra-household gender hierarchies influence technology access** is crucial for designing effective responses to address them. Women may also use different communication and information channels than men, as they have lower literacy rates, less access to television and radio, and less time to attend public meetings. They may even be reluctant to express their views at meetings.

As **primary users of energy** in the household, women's direct engagement in renewable energy projects is critical to ensuring that the projects have a positive impact and are widely used and accepted by their intended beneficiaries. Because women are typically responsible for cooking, they often have a **comparative advantage in reaching out to other end-users of clean cookstoves**.

**Making normative assumptions about women's nurturing roles perpetuates and deepens gender divides through a feminisation of certain responsibilities and obligations**. Organisations in the renewable energy sector should avoid the rhetoric of cooking technologies as women's needs. They should describe and promote them as general human needs.

## 2. Lack of gender sensitive programmes and policies

Gender-blind energy sector policies and programmes **fail to integrate women's experiences, expertise and capacities**, and risk further exacerbating the gender gap between men and women in the energy access context. An examination of renewable energy policies in 33 countries by the United States Agency for International Development (USAID) and ENERGIA found that **only 6 policies (18%) included gender keywords** and considerations.

Moreover, when referring to themes on energy access and women's engagement in the sector, the policies often referred to gender issues through terms such as **"vulnerable", "recipients" and "beneficiaries"**. The acknowledgement of women as **passive beneficiaries** does not make these programmes gender sensitive, although progress is being made to address such concerns.

For energy projects to have an effective gender-sensitive approach, it is essential that they **highlight the participatory and active role of women in programme implementation** and adequate budgetary provisions are in place within relevant ministries, programmes and schemes to support gender related activities.

### **3. Lack of skills and gender-specific training opportunities**

The lack of skills is a key barrier faced by women seeking to participate in efforts to expand modern energy access through off-grid renewable energy solutions. To overcome it, **over 40% of the respondents highlighted the importance of tailored training** opportunities for women.

**Training opportunities are often not equally accessible by men and women.** One reason relates to cultural and social norms, especially where such norms are deeply entrenched. Even if women have the enthusiasm and motivation to be engaged in the off-grid renewables supply chain (e.g., as distributors), they may be discouraged by others in the household from attending/ continuing the training, or from working after completing the training.

**Social norms often also broaden the gender gap** in measures of human capital such as financial literacy and entrepreneurial management. As such, women are more likely to partake in minor income-generating activities in informal sectors related to cooking and sewing, and less likely to participate in more technical sectors such as renewable energy. The low profitability of these womenled businesses in the informal sector results in a lower likelihood that households will invest in women's education and training. This creates a vicious cycle that relegates women to informal and unpaid work.

#### **12.4.3 Policies and solutions**

In seeking solutions to improve women's engagement in the renewables sector for energy access, survey respondents highlighted first the importance of access to training and skills-development programmes. Over half the respondents also cited improving access to finance and mainstreaming the gender perspective in energy access programmes as important to improve women's engagement (see figure 12.11).

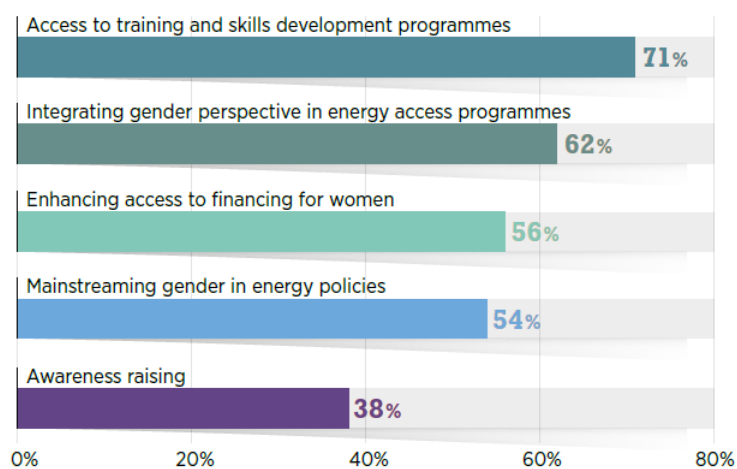
##### **1. Improving access to training and skills development programmes**

Women's participation in the energy sector cannot be enabled without adequate capacity building and training conducted at all levels of entry into the industry (ADB, 2018). A key prerequisite, if women are to play an active role in the deployment of off-grid renewable energy solutions, is **awareness of opportunities and access to necessary technical, business or leadership skills**.

**Cultural and social norms, and to the traditional roles fulfilled by women in rural communities** need to be taken into account while conducting training programs. For instance, training sessions must be scheduled around women's childcare responsibilities and be sensitive to mobility constraints and security concerns; programmes must consider social restrictions that may prohibit women from participating actively (UN Women, 2016).

Broader training is needed in business, **financing and leadership skills, product standards, and quality control**, among other areas. **Marketing skills** are especially needed for renewable energy technologies such as solar home systems and solar lanterns that are sold to households.

Figure 12.11: Measures to improve women's engagement in deploying renewables for energy access



Source: IRENA online gender survey, 2018.

Note: The respondents were asked to select three key measures to improve women's engagement in deploying renewables for energy access. The percentages represent the share of respondents who selected a specific measure as one of their top three.

Source: IRENA (2019)

#### Training solar grandmothers: The case of Barefoot College

The “solar mama” programme at the Barefoot College is a well-documented example of the democratising power of **off-grid renewable energy solutions** and the transformative potential of training women in **rural areas**. The programme has trained over 1000 women from more than 80 countries, leading to the deployment of at least 18000 solar systems.

The trainees are often **illiterate or semi-literate women** who maintain strong roots in their rural villages and have the potential to play a key role in bringing **off-grid solar solutions to remote, inaccessible villages**. The initiative works to demystify the technology and place it in the hands of local communities.

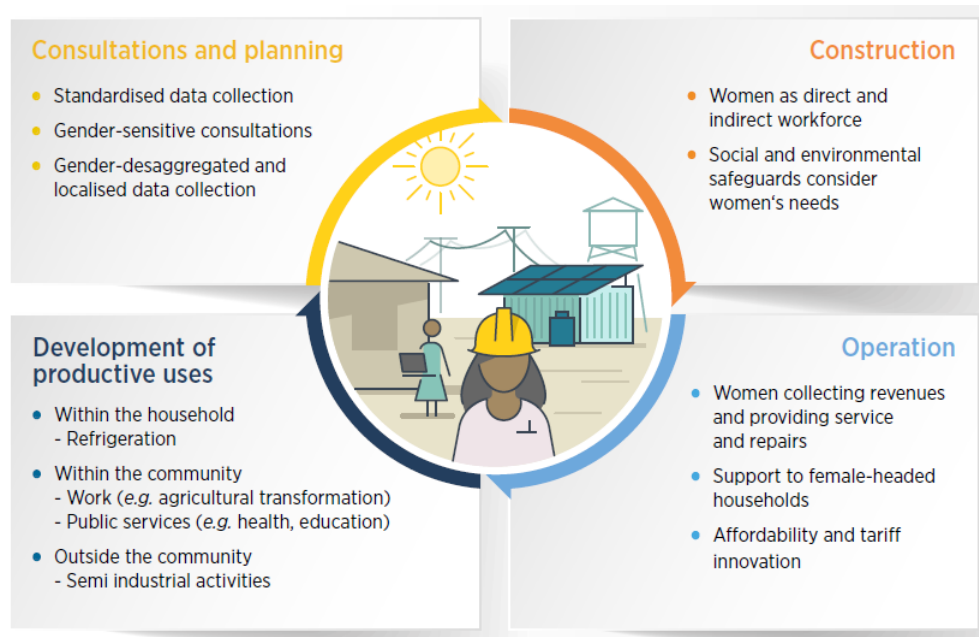
Over a period of six months, trainees receive instruction on **assembly, installation, operation and maintenance of solar lanterns, lamps, parabolic cookers, water heaters and other devices**. The women return to their villages with equipment to deliver sustainable electricity to their community and become role models for other women in the village.

## **2. Integrating gender in energy access programmes**

**Promoting interaction between different sectors**, such as primary health, education and water, is key for women's economic empowerment and advancement and can help formulate solutions that look at the entire ecosystem and maximise the benefits.

**Development financing institutions and agencies** that often design, manage, implement and finance energy access programmes strongly influence practices related to gender mainstreaming in the sector. Several such institutions and agencies have taken steps to integrate gender within their respective energy access programmes.

Figure 12.12: Illustrating gender entry points in the development of renewable energy mini-grids



Source: IRENA (2019)

**Training and skills-building** are also effective means of engaging women in the construction and maintenance of off grid renewable energy technologies, as well as in promoting productive end-uses that support local socio economic development. Figure 12.12 illustrates the different entry points for women's engagement in the development of a renewable energy mini-grid.

#### Gender mainstreaming at the programme level:

##### The case of Hivos' domestic biogas programme and Sumba Island Initiative

In 2011, Hivos, a Dutch development aid organisation, was engaged in eight domestic biogas and two improved cookstove programmes in Africa and Asia. After assessing gender mainstreaming in policy and practice, it concluded that core issues of gender inequality were not always being addressed sufficiently. It called for a better understanding of gender issues in all programmes and **identified concrete opportunities for mainstreaming**.

The cooking energy programmes, including the African Biogas Partnership Programme and Program Biogas Rumah in Indonesia, had not all defined gender goals from their inception. Gender equality was integrated in the programme's planning, implementation, monitoring and institutional set-up from 2011 onwards. For instance, **training approaches within biogas programmes have been adapted to address gender issues more effectively** to ensure that women and men are equally engaged. In all countries, the **proportion of women trainees has gone up significantly**, with positive outcomes for long-term sustainability and socio-economic benefits.

As part of its Sumba Island Initiative in Indonesia, Hivos is working with the local and national government to devise approaches to integrate gender in the renewable energy sector. Hivos has capacitated four local civil society organisations who coach or mentor local entrepreneurs and users of renewable energy systems on **identifying gender gaps and ways to address them including building shared-vision between husband and wife** from the energy access they have for better a livelihood. At the national level, Hivos has engaged Ministry of Women Empowerment and Child Protection, to together identify potential gender integration models in the sector with two test locations: Sumba and Salatiga, Central Java.

### **3. Fostering women entrepreneurs and improving access to finance**

1. Women's entrepreneurship within the energy sector has the potential to significantly enhance economic growth and promote their social inclusion and empowerment. Women-led enterprises tend to have a stronger emphasis on social value.

Women are also more **easily able to reach out to and interact with female end-users**, especially in situations where women are primary users and also in areas where cultural and social norms inhibit public engagement with women.

As women become engaged in delivering energy solutions, they take on more leadership in their communities and consequently facilitate a gradual paradigm shift in the social and cultural norms that traditionally acted as barriers to their agency. Active engagement further contributes to women's economic and financial independence by increasing income-generating opportunities and enhancing women's social and political status (box below).

#### Empowering women brewers in Burkina Faso through energy-efficient cookstoves

Burkina Faso's traditional small-scale beer-brewing sector is predominantly **led by women and is an important source of income for rural women**. But poorly designed, inefficient cookstoves cause health problems and require longer cooking times and higher fuel consumption.

In 2012, a programme to install over 500 energy-efficient cookstoves reached an estimated 800 women by helping them **build clusters that identify and promote their business development priorities** including financial management, technology upgrading and improving the hygiene of the production. The women were **grouped together in associations and encouraged to use self-help groups to finance the purchase of improved cook stoves**. The programme also establishes a credit risk guarantee mechanism to help women access additional financing. They were also trained on how to operate and maintain the energy-efficient cookstoves. The women were also motivated to initiate the formation of a nationwide federation for beer brewers to pursue the common interests of women working in the sector.

Following the implementation of the project, women's profits and income increased and they had more social standing within their communities. The **high efficiency of the cookstoves** also reduced the amount of firewood required by over 40%, thus also reducing the health risks and physical or sexual assault risks to women collecting firewood.

2. In order to scale up women's engagement in entrepreneurship, **training and mentoring programmes** focusing on technical, financial and leadership skills are essential for developing stable energy businesses (box below). Such programmes enable women to identify viable business opportunities, form useful networks to expand their business activities and devise effective market strategies to run successful businesses. Mentorship and training opportunities ease women's inhibitions about taking on leadership roles and bridge the gap between women and the formal, more-male-dominated sector of the economy (SEforAll, 2017).

#### Empowering women entrepreneurs to deliver off-grid renewable energy solutions: The case of Solar Sister

Solar Sister is a training and job creation initiative for women that distributes portable solar lights in rural Sub-Saharan Africa through female entrepreneurs. Entrepreneurs are trained to **sell solar lanterns and are given the opportunity to build sales and a cash flow by earning a commission**, which they then re-invest in new inventory.

Solar Sister equips women to build **their own technology-driven businesses** and provides a holistic package of inputs (including business and technical training, a quality brand, access to world class products and service, marketing support and ongoing coaching).

As of 2018, it has benefitted 3554 entrepreneurs, of whom 83% are women.

3. **Access to finance** is another binding constraint women face in setting up small and medium-sized enterprises. Although 48% of business owners in Kenya are women, only 7% have access to formal credit. Women are also less likely to have bank accounts than men, particularly



due to the lack of bank branches in rural areas (SEforAll, 2017).

4. Various solutions are emerging, including **dedicated credit lines, crowdfunding and local community organisations and cooperatives**. In **Kenya**, for instance, women-led enterprises unable to access funding from traditional financing institutions have raised financing through crowdfunding platforms that utilise mobile payments. Despite the success enjoyed by some such innovations, inadequate access to affordable financing remains a major impediment for women setting up small businesses in the energy access context.

5. **Mentoring programmes** are essential in guiding women who are interested in the energy sector and encouraging them to overcome hesitations and barriers associated with traditional socio-cultural perceptions and stereotypes.

6. The **private sector** also has an important role to play in supporting women-led enterprises. Partnering with women entrepreneurs is a mutually beneficial option, as women often have extensive local networks, specialised skills and an in-depth understanding of local markets that can help the private sector address market barriers.

IFC's Lighting Asia programme in India, for example, has facilitated partnerships and networking between Indian solar distributors and women entrepreneurs in rural areas. Through the development of these networks and partnerships, distributors have been able to overcome cost and market barriers in last-mile communities and increase sales of solar lighting products by approximately 30%.

7. It is important to provide the **right type of support for women-led enterprises**, but it is also important to remember that entrepreneurship is often not a realistic livelihood strategy for some women, and even well-intentioned and well-designed interventions by governments, private sector organisations and social enterprises may fail to convince them to become entrepreneurs. Women from the poorest households are generally averse to entrepreneurship, often because they have no capital to invest and no collateral against which to borrow. They are much more likely to pursue employment opportunities in renewable energy if they can earn incomes without becoming indebted. Acquiring new skills – such as learning to build and repair renewable energy technologies – is often better suited to their economic realities and limitations.

**Social enterprises and non-governmental organisations (NGOs)** that disseminate renewable energy technologies to low-income populations are aware of this fact and some have started to offer training in such skills.

#### 4. Improving the collection of gender disaggregated Data

The lack of gender-disaggregated data exacerbates the gender gap within the energy access field because it distorts perceptions of the level of gender inequality within the sector. This hinders **baseline evaluations of gender inequality** which underpin the development of gender-sensitive targets and indicators, the same targets and indicators that subsequently inform gender-sensitive programmes and policies. The result is a decrease in the effectiveness and accuracy of gender-responsive strategies.

For the differences between men and women across social, economic, environmental, political and cultural dimensions to be fully grasped, both **qualitative and quantitative data collection** and analyses are necessary. Progress is being made and a greater attention is being paid to the collection and reporting of gender disaggregated data (box below).

### Gathering gender-disaggregated data through household surveys

**Household survey data** provide a better picture of energy access than data from service providers. By capturing more indicators, such surveys enable analysis of access trends across **socio-economic segments** (e.g., urban vs. rural, male- vs. female-headed households). The World Bank's Global Poverty Working Group Database analyses datasets of household-level data, including household electrification status and gender of head of household, allowing valuable insights on how (and where) access varies.

Gender-disaggregated data show that **electricity access for male- and female-headed households differs only slightly** overall – 33% and 31%, respectively. **Disparities emerge for some countries**, however. In some countries (Ethiopia, Mali, Nigeria), access rates for female-headed households are two percentage points higher; in others (Angola, Bangladesh, Chad, Sudan, Zambia), male-headed households enjoy substantially higher access rates.

## 12.5 Questions to summarize the chapter

1. Concerning the women in the **modern renewable energy sector**:
  - a. Which is the **status and main trends** in that sector?
  - b. Which are the main **barriers** that women face to enter in that sector?
  - c. Which are the main **barriers** that women face in the **retention in the sector** and in their **careers advancement**?
  - d. Which are the **policies** that could facilitate women's participation in the modern renewable energy sector?
2. Concerning the women in the **access to renewable energy**:
  - a. Which is the **status and main trends**?
  - b. Which are the main **barriers** that women face to access to renewable energy?
  - c. Which are the **policies** that could facilitate women's access to renewable energy?

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