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World Small Hydropower Development Report 2022

THEMATIC PUBLICATION:

HOW SMALL HYDROPOWER EMPOWERS WOMEN, CLOSES GENDER GAPS AND CAN DO MORE

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Partner Organizations

GWNET Global Women's Network for the Energy Transition

azurit

iha international hydropower association

SGP The GEF Small Grants Programme DOMINICAN REPUBLIC

gef

UNDP

Guakía Ambiente

sibat SIBOL NG AGHAM AT TEKNOLOHIYA (WELLSPRING OF SCIENCE AND TECHNOLOGY)

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I. Introduction

Empowering women and girls and closing gender gaps are critical to realizing sustainable development goals (SDG) and ensuring a good quality of life for all. This is reflected in SDG 5, which aims to 'Achieve gender equality and empower all women and girls. SDG 5's targets include ending all discrimination against women and girls, eliminating harmful practices, such as child, early and forced marriage, recognizing and valuing unpaid care and domestic work through the provision of infrastructure and promoting shared responsibility within the household and the family, ensuring women's effective participation and equal opportunities for leadership at all levels of decision-making, enhancing the use of enabling technologies to promote women's empowerment and ensuring universal access to sexual and reproductive health and reproductive rights.

The energy sector, and in particular, decentralized systems such as small hydropower (SHP) can facilitate the achievement of these targets. SHP can provide not only sustainable energy but also a steady baseload, which is not always possible with other renewable energy sources such as solar and wind power, which are intermittent. Such reliable power can facilitate positive changes in women's lives in the communities in which SHP plants are constructed and beyond these communities.

Benefits at the planning and construction stages can incorporate the inclusion of women in decision-making and infrastructure governance, giving women opportunities to influence areas that they are traditionally excluded from and improve their job opportunities. In countries where women are excluded from land ownership and related benefits, gender-responsive resettling and/or land use agreements about SHP, such as payment of levies or leases, can improve women's land ownership or improve the benefits they can derive from land.

In countries with low levels of access to electricity, benefits of electricity access from SHP plants for women can include reduced time poverty and drudgery due to the use of electric appliances for household chores and economic activities. This immediately improves women's welfare but can also have knock-on benefits when such time is invested in studying, income generation and other life-enhancing activities. SHP development can also create direct and indirect jobs, provide power for productive uses and income generation and improve the delivery of critical social services including education and health services. In cases where the SHP developers invest in community infrastructure, women benefit from improved road networks or water supply. Access to electricity and the advent of modern infrastructure can result in an improved sense of social inclusion for rural and remote communities.

The suitability of SHP for decentralized, off-grid generation means it can be and is often constructed in rural and remote areas where in many cases, SDG 5 (the gender SDG) and other SDGs, lag the most. Thus, the contribution of SHP to closing equality gaps can be particularly critical in such areas. SHP has the added advantage that, compared to large hydropower, when appropriately planned it can result in fewer adverse environmental and social impacts, yet can provide adequate electricity to catalyze transformative changes for communities and women specifically. Further, SHP plants can be important for decentralized renewable energy systems since they provide a baseload and can be combined with other technologies, e.g., solar power or wind power, to create a mini-grid system. SHP can therefore play a critical role in achieving universal access to sustainable energy (SDG7), building resilient infrastructure, promoting inclusive and sustainable industrialization, fostering innovation (SDG 9), combating climate change (SDG 13) and overall, facilitating a just transition to a net zero emissions energy system.

Although few studies document the gender impacts of SHP development and use, there is emerging evidence, as shown in this chapter, that SHP does help empower women and girls across the globe, and close gender gaps. This is especially true when a gender approach[1] is intentionally made part of project design and implementation. This chapter discusses some of how SHP development is empowering women and girls and closing gender gaps between women and men. Further, it discusses the barriers to women's participation in the SHP sector and makes some key recommendations for addressing these barriers. It is based on a review of the literature and interviews with various stakeholders in the hydropower sector across Africa, Asia, Latin America and Europe.

While SHP can be off-grid or on-grid and can range in capacity from pico-hydropower (a few kilowatts) up to several megawatts,[2] much of the evidence in this report is based on off-grid SHP plants that are less than 1 MW. This is because much of the discussions on energy and gender equality have focused on low-income and transition countries, where for various reasons, SHP development has focused on off-grid and lower capacity systems. Additionally, off-grid systems provide power to specific communities where impacts are easier to trace. In contrast, on-grid SHP plants usually provide power — often mixed with other sources — to a range of users making attribution and contribution analysis difficult.

Over 20 experts were interviewed for this report, including male and female project developers and managers, financiers, engineers, hydrologists, investment experts, academicians, policy advocates, mentors and gender experts.

II. How SHP is empowering women and closing gender gaps

II.A Enabling women's participation in community infrastructure development and governance

Women are often excluded from participating in decision-making regarding the development of infrastructure and governance in general. The size range — from a few kW to 10 MW — and the often decentralized nature of SHP mean decisions can be made at a local level, where a gender approach to SHP development presents an opportunity for women to be involved in decision-making and governance relating to infrastructure development.

Since 2008, Guakía Ambiente has been working with rural communities in the Dominican Republic and to a lesser extent in Haiti, constructing, operating and maintaining community-run micro-hydropower. A key aspect of Guakía Ambiente's approach is ensuring the participation of community members, including women, in its projects. To ensure full participation, Guakía Ambiente starts consultations regarding the SHP development before the feasibility studies phase to ensure that women and men are part of the initial decisions (Izzo, 2021). In consulting women, Guakía Ambiente uses participatory methods such as focus group discussions (FGDs). In Pakistan, the Aga Khan Rural Support Programme (AKRSP) which has constructed and managed SHP plants since the 1990s, uses a similar approach. Due to the cultural and religious context in some of their project areas, AKRSP sometimes uses women-only FGDs and consults women in spaces they inhabit such as in women's groups where they are already comfortable discussing various issues (Khan, 2021). Both Guakía Ambiente and AKRSP ensure that some of the FGDs focus on gender issues to make sure key opportunities and constraints relating to women's participation and needs are identified and addressed. In Nepal, the Alternative Energy Promotion Centre (AEPC) has been promoting renewable energy, including hydropower, since 1996. Women are included in the development of community hydropower as a matter of AEPC's Gender and Social Inclusion (GESI) policy. Women are consulted during planning and it is a requirement that women are included in hydropower committees that govern the development and use of micro-hydropower plants developed with AEPC's support (Chaudhary, 2021). Where few women are volunteering for committee positions, AEPC draws them from women's development groups called Amma Samuha, to be elected as hydropower committee members (Chaudhary, 2021; Govindan, Murali et. al., 2019).

Box A: Participation of Women in SHP

In the Ixil and Zona Reina regions in the Department of Quiché (Guatemala), Semilla de Sol uses participatory methods to encourage women's participation in their community micro-hydropower projects. In July 2014, Semilla commissioned a 90 kW hydropower plant, which is operated and maintained by the Hydroelectric Association for the Integral Development of Northern Quiché (ASHDINQUI). ASHDINQUI is made up of an equal number of men and women, allowing women to be a key part of the decision-making and governance of a community infrastructure that supplies electricity for 141 families, 19 small businesses and other services in the three communities (ENERGIA, 2015). In the Semilla Sol initiative in the Batzchocolá community micro-hydropower plant in Nebaj, Guatemala, indigenous Ixil Maya women are not only included in the hydropower association but one of them also holds a leadership position and supports communication among women and between indigenous women and project sponsors (ENERGIA, 2015) who are external to the community. This intermediation role ensures that concerns of indigenous women — some of the most excluded groups globally — are considered in Semilla Sol's developments.

Women in hydropower committees such as the ones in the Dominican Republic, Pakistan, Nepal and Guatemala, highlighted here, not only get an opportunity to be part of decision-making but also tend to represent and relay the interests of other women in their communities. This ensures that the hydropower infrastructure is governed in ways that account for women's interests and benefit women.

Women's participation in hydropower development can also influence decision-making and governance beyond small communities, impacting national and regional policies and discourse. In central Bosnia and Herzegovina (BiH), women protested the construction of the 1.5 MW Luke hydropower plant without consultation as it was perceived to threaten the Kruščica River, including the community's fresh drinking water and livelihoods. Some of these women were later elected to the local village council to be part of decision-making (*Gallop, n.d.; Murphy, 2020*), allowing women to become part of broader local governance that they were traditionally excluded from. Their participation in the protests at the local level has led to national-level policy changes and even Balkans-wide debates on sustainable approaches to SHP development. This shows how women's participation in SHP can lead to improved governance of the sector and renewable energy in general.

II.B Opening opportunities for more and better jobs for women

SHP development offers a range of direct and indirect job opportunities for women ranging from technical to non-technical, whether temporary or permanent. Given that SHP plants are often located in rural or remote areas, SHP development and SHP plants present opportunities for new and often better jobs in areas that typically have few job opportunities for women.

Direct jobs can be short-term as those created during construction or medium to long-term, which relate to the management and operation of SHP plants. In Zambia, the Zengamina hydropower company created 400 local jobs during construction, 40 per cent of which were taken up by women (WSHPDR *2019*). In the remote mountain regions of south-western China, a group of 95 SHP projects collectively called the *Huóshuǐ* SHP, ranging in capacity from 0.1 MW to 14 MW, provide direct employment to 240 women representing 30 per cent of the workforce on *Huóshuǐ* SHP (Southpole, 2018). In Uganda, Frontier Energy has developed a range of SHP plants that feed into the national grid. The company employs 26 women, representing 16 per cent of its workforce (Kateregg, 2022). In Kenya, Magiro hydropower has 15 permanent employees, of which 5 (or 33 per cent) are women (Kagoche, 2022). For Magiro, 11 of the jobs are in rural locations where 3 of the 5 women employed by Magiro hydropower are based. In Malawi, MEGA limited in Mulanje has employed women representing 9 per cent of its employees (Kadziponye, 2022). Although 9 per cent is low, in the context of rural Malawi where few women are employed, let alone in technical sectors, this is an achievement. The jobs in these SHP undertakings are in a range of roles including operators, environmental and social auditors, social sustainability managers, customer services managers and others. They are particularly pertinent as they are often in areas with few job opportunities and because they showcase women's capabilities and job opportunities in these communities, often catalyzing change in narratives and attitudes (Box 2).

Box B: SHP: Breaking Barriers and Creating Jobs for Women

Bang village in Yarkhum Valley in Upper Chitral District in northern Pakistan is a village of 200 households. Its remote location, local customs and religious requirements mean work opportunities for women are limited. Hasana Fatimi is one of the few women in this valley with a Master's degree. Having taught at a private school over 150 kilometres away from her village, Hasana decided to return to her village and inspire women and show them that *"everything is possible, to dream big and to aspire for more meaningful things in life"*. An 800 kW hydropower plant, which is managed by the community-owned Yadgar Utility Public Limited Company, presented an opportunity for her to actualize her vision. Hasana interviewed for the position of sales officer and was selected. Hasana Fatimi is one of two women that manage the two Vending Point Systems that serve 1,200 households. Hasana feels this inspires other women because *"it indicates that women are not only able to operate this technology, but are entrusted with this very crucial component of the mini-hydropower system"*. Hasana's job not only allows her to be a role model, but she also actively advises women on how to start small businesses and directs women and men to the training department of the Yadgar Utility Public Limited Company.

Source: HPNET, 2021

Similar to the impact of women's participation in SHP in Pakistan, Businge reported how as one of the first women in Frontier Energy, Uganda, she became a role model for other women *"whom I talk to about my role and they realize it can be done. Since then, we have eight women operators that I have added to the workforce, and we are still adding"*.

Beyond direct jobs catalyzed by SHP development, SHP creates indirect jobs that are stimulated by the arrival of electricity in a community. In Pakistan's Peshawar Valley, AKRSP's hydropower plants have powered gemstone processing companies that have employed women that typically have no job opportunities (Khan, 2021). In Kenya and Malawi, women have been employed in hair salons, bakeries and other businesses enabled by electricity from SHP (Kagoche, 2022; Kadziponye, 2022). Similar to Malawi and Kenya, women in the indigenous province of Kalinga in the Philippines have had job opportunities open up to them as a result of electricity from SHP (Angngalao, 2022).

II.C Benefits of electricity use: reducing drudgery and improving women's welfare

The use of electricity unlocks opportunities for women when they access appliances, including bulbs and cooking appliances. When women access electricity and appliances, they can experience significant reductions in time poverty (ENERGIA, 2018), a dimension of poverty that women globally experience more than men and which is a key barrier to women's empowerment and closing gender gaps. When the time women spend on chores is reduced because of electricity, the time "gained" can

be used for studying, engaging in income generation activities and participating in community activities, which can close gender gaps in education and associated opportunities, in economic and political power. Time "gained" can also be used for rest, which is critical for women's health and well-being.

In Senghor, Bhutan, after a 100 kW micro-hydropower plant was constructed, 100 per cent of the homes obtained rice cookers and 50 per cent obtained curry cookers and water heaters through the United Nations Development Programme (UNDP, 2009). These appliances led to reduced drudgery and saved time, gaining 1.5 hours that residents, mostly women and girls, used for studying, socializing, and entertainment (UNDP, 2009). In Pakistan's Bumboret Valley, some women reported that before electrification, women washed clothes by hand at the river, which took 6 hours (from 10 am until 4 pm).[3] After electrification, women took two hours to wash clothes using washing machines (Ashden, 2015) with little effort on their part. Similarly, in the Dominican Republic, women's drudgery was reduced when they used electric washing machines (among other appliances) for washing (Guakía Ambiente, 2016; Izzo, 2021). In Nepal in 1992, a 50 kW micro-hydropower plant was installed in Ghandruk, supplying 272 households with electricity (PACE, n.d.; ITDG, n.d.). The Annapurna Conservation Area Project (ACAP), a Nepalese organization that developed this project recognized the importance of electric cooking and set up a revolving fund to subsidize *bijuli dekchis* (low-wattage electric cookers) to encourage electric cooking.[4] Within the first two years, 85 electric cookers had been purchased and were in use (Practical Action, n.d.).[5] These cookers were said to reduce firewood collection and the time spent cooking, improving women's welfare (Practical Action, n.d.). In a project supported by the AEPC in Mahadevsthan, Nepal, women reported that rice cookers and spice grinders, enabled by access to micro-hydropower electricity, reduced the drudgery associated with, and time spent on, food preparation (ENERGIA, 2018). In Malawi, the 220 kW SHP plant operated by MEGA Ltd has reduced drudgery and the time women spent travelling the 8 kilometres to mill maize (for household use), which they now mill within their communities (Kadziponye, 2022). Reductions in drudgery and time spent on chores also occur when electricity powers community infrastructure critical to women's livelihoods such as domestic water supply and food processing facilities. In the Balbalan in the Philippines, hand-pounding 10 kg of rice — which lasts a family of five approximately five days or three days for a bigger family — takes five hours and is done almost exclusively by women and girls. It is hard, exhausting work. The arrival of micro-hydropower (20 kW) has meant simply taking the rice to the mill (Angngalao, 2022; Catarata and Bacala, 2022). In Tulgao, the Philippines, an SHP plant allowed for the electric milling of rice, a task that was undertaken manually by women before the advent of SHP-enabled electricity. The women in Tulgao previously spent 1.15–1.70 hours manually dehusking (by hand pounding) 2.5 kg of rice before electrification (Lumampao, 2005). While Lumampao does not provide the time savings due to electric rice milling, milling rice with electricity requires far less effort from the women compared to having to hand-pound rice to dehusk it.[6] In Uganda, the construction of the 5.4 MW Lubilia Kawembe SHP plant also included the construction of the water supply, which reduced the time women spent on collecting domestic water (Roboti, 2019; Kateregga, 2022).

II.D Financial savings

Where SHP replaces fossil fuels, households can experience financial savings. In Indonesia, the People Centred Business and Economics Initiative (IBEKA), which has a network of hydropower plants, reported significant savings. When households used kerosene for lighting, they spent between USD 5 and USD 20 per month for lighting. When this was replaced by electric lighting from micro-hydropower, lighting cost households as little as USD 1 per month (Ashden, 2012). In Kenya, electric lighting from a 30 kW micro-hydropower plant developed and operated by Magiro Hydropower costs households USD 1 compared to the use of kerosene, which cost USD 24 per month (SEED, 2016).[7] In households in Mulanje, Malawi where MEGA Ltd supplies electricity to 1,200 households, women reported that they saved when they transitioned from buying kerosene and/or dry cell batteries for lighting and batteries for radio, which were said to be more expensive than the electricity from SHP. Such savings can provide additional cash to households and relief for women who are often in charge of managing energy and food budgets.

II.E Benefits of electrifying infrastructure: Improving women's health and education

An estimated 59 per cent of low and middle-income country healthcare facilities lack reliable electricity and 31 per cent of schools lack access to electricity (Cronk & Bartram, 2018).[8] Yet, this is the infrastructure that is critical especially for women, who are key care providers in the home and at the community level and face more mobility constraints than men.[9] SHP can and does play a critical role in increasing the level and quality of services available for women especially in rural and remote areas, through electrification. This role is well-illustrated in a Nepalese study. A survey of 24 micro-hydropower plants in Nepal found that these powered 84 schools, 40 hospitals or health clinics and 9 community centres (Butchers et. al, 2020).

The powering of clinics can be critical for women's health, improving chances of a safe birth, even when the electricity is used for something as basic as lighting but more so when it powers various equipment. In Mahadevsthan, Nepal, electrification of the village clinic improved women's comfort during childbirth because of the availability of good quality lighting, while in Kalinga province in the Philippines, SHP electricity reduces the travel burden for pregnant indigenous women, who are some of the most marginalized persons in the country:

> "My village is in tribal islands so, before the micro-hydropower facility, women travelled 10 hours at least just to see a midwife when they are pregnant. After electricity, the midwife can do that locally. So, I would say it has been good for the health of indigenous women in the Philippines."
>
> **Indigenous mother, 2022**

In Batzchocolá, Nebaj in Guatemala, the advent of a 90 kW micro-hydropower plant, which powered a health clinic (as well as households and other facilities), meant that the clinic could offer 24-hour services to patients and could store onsite vaccines that needed chilling (ENERGIA, 2015). In Malawi, Mulanje Electricity Generation Agency (MEGA) Ltd electrified a local clinic in Bondo village. MEGA also supported the clinic with equipment such as manual and electronic blood pressure monitors, a resuscitator and a 100-litre electric geyser to supply hot water. This reduced the need for patients and especially pregnant women to travel 25 kilometres to the next hospital that offered hypertension monitoring services.[10] Electricity at the Bondo Clinic also reduced women's burden of taking family members to clinics 25 kilometres away and its caseload increased from a daily average of 120 cases to 280 patients a day signifying that more people used the local clinic after electrification compared to before. A similar pattern was observed in Zambia (Box c).

Box C: Powering Women's Health and Saving Lives

Kalene Hospital is located in Kalene Hills in the Ikelenge District, in north-western Zambia. Before the 750 kW Zengamina SHP plant, electricity was supplied via an expensive diesel generator to the Ikelene hospital for three hours per day and this was the only time staff could do surgeries, X-rays and laboratory diagnostics that required electricity (NWZDT, 2012). Other than limited electricity availability, the costly diesel was purchased 700 kilometres away, requiring transport costs, further increasing the operational costs of the hospital. There were no incubators for premature babies and distressed infants, and laundry was done by hand. The nearest town with grid electricity was 380 kilometres away, which meant that those requiring services that were dependent on electricity had to either travel 380 kilometres or wait for services offered in the three-hour window, depending on the backlog. The Northwest Zambia Development Trust (NWZDT) started the construction of the Zengamina plant in 2004, which was commissioned in 2007. After the Zengamina plant became operational in 2008, the hospitals acquired and used electric incubators for premature and distressed infants, oxygen concentrators, monitors, pulse oximeters, ultrasound, X-ray, laboratory automatic analyzers and other equipment that improved service delivery, including performing major surgeries (NWDZT, 2012). Women seeking maternal and reproductive health services especially benefitted since surgeries such as c-sections, neo-natal surgeries, incubation of premature babies and other services were possible, thereby saving lives. Additionally, 24-hour lighting allowed proper patient assessment, while washing machines ensured that linen was properly laundered and sanitized. The hospital also acquired electric tools for repairs and renovations to the hospital structures and personnel housing, ensuring better living conditions for both patients and staff. This meant women could deliver more safely locally, premature and distressed infants had better chances of surviving and children and family members could access better services locally. With improved services, the service catchment area increased and patients come not just from within Zambia, but also Congo and Angola.

The hospital also reported that after electrification, costs of 24-hour power were less than those previously paid for, at three hours per day of power (NWZDT, 2009), thereby reducing the operational costs of the hospital. Additionally, the coming of hydropower to Ikelene contributed to the reopening of the Ikelene Nursing School, which had closed (NWZDT, 2009). This will ensure the development of local health staff, with long-term benefits for the Ikelene community and surroundings. Two more clinics were also electrified, providing primary health care to their communities.

The benefits of electrifying the Ikelene hospital continue as shown in a 2020 study. All health workers interviewed reported that *"since the introduction of electricity, students who train there are more willing to stay to work there, attributing this to the advantages brought by electricity"* (Caperon & Brand-Correa, 2020).

Health benefits from electricity use can also result from electricity powering clean water supply, when appliances such as rice cookers significantly displace firewood for cooking, or when bulbs replace kerosene for lighting, which has been shown to have adverse health effects due to pollutants they emit, but such changes can take time and might need policy support.

"When electricity first came, they [villagers in Balbalan, the Philippines] didn't use rice cookers, water heaters, refrigerators. Now they are using electricity and incomes increased now, so they use all these [appliances]. The problem is [that] at peak hours the capacity is not enough to meet the energy demand of the community. So, they must manage their load and women use LPG or cook earlier, before 17:00, when you have to stop using it for cooking because people watch television".

Former female hydropower technician, Balbalan, the Philippines, 2022

"When micro-hydropower first came to Mulanje, I can say few households used it for cooking. But by the time we electrified 1,200 households, 5 per cent used it for cooking. When we piloted a one-plate cooker in 20 households, we noted increasing interest as other households observed the benefits. We will scale this up but expect there will be more updates as we scale up and show the benefits of electric cooking."

Kadziponye, MEGA Manager, Mulanje, Malawi, 2022

In terms of education, electrification can open up new subjects such as computing for students as well as evening classes. And there is emerging evidence that when electricity at home frees the time women and girls spend on household chores, their study time and enrolment in schooling or adult classes can increase (ENERGIA, 2018). In Pinthali village, older women who had previously missed out on education reported that micro-hydropower enabled them to study at night (Joshi, 2019). As a result, they gained literacy and numeracy skills, which improved their understanding of their business transactions and reduced the chances of customers cheating them (Joshi, 2019). In the Ikelenge District in Zambia, the Zengamina SHP plant connected at least five schools to electricity including a night school (ERB, 2015). In Malawi, the MEGA hydropower plant has electrified 10 schools, enabling improved services, which, beneficiaries say, has increased the number of female teachers in the electrified communities and improved students' performance, especially girls who have extra study time using electric light in the evenings (Kadziponye, 2022). Some women who dropped out of school started attending night classes at two local secondary schools because classes felt safer when the school was electrified. The Sibol ng Agham at Teknolohiya (SIBAT, Inc.), is a non-profit organization engaged in the development and promotion of appropriate technologies and has been installing micro-hydropower plants in the rural Philippines. One such power plant is in the Abra District which has electrified 20 primary schools. One of these schools has an electrified boarding facility which is particularly crucial for girls given that commuting from home would take too long for many of them (Catarata & Bacala, 2022). During the COVID-19 pandemic lockdowns, teachers were able to type and print materials for blended learning:

"In the Hinterlands, there is no internet signal. Public school teachers provided blended learning and provided modules to students and children could study because the micro-hydropower allowed the teachers to work on their laptops, and print learning materials locally. Most of these teachers are women so they were helped because they did not have to travel far. And students including girls from a remote indigenous area did not have to miss schooling simply because they have no electricity or internet."

Catarata, the Philippines, 2022

II.F Women's economic empowerment: Productive use of electricity and income generation

SHP can increase women's opportunities for productivity and income generation, thus enhancing their economic empowerment. In Pakistan in Khyber Pakhtunkhwa where AKRSP has supported the development of hundreds of SHP plants, women were trained in leadership and productive use of SHP. The women use the electricity from SHP for their fruit-drying businesses. This led to them receiving better prices in the market, leading to a 150 per cent increase in women's income (UNFCCC), n.d.). Additionally, AKRSP supports women with skills training and the use of electricity for jewellery making, mobile phone repairs, sewing and general business and financial skills. Women are also helped to access finance and/or are provided with assets such as sewing machines or mobile phone repair kits to start their businesses (Khan, 2021). In Mahadevsthan in Nepal, some women use the electricity from their community's hydropower plant for poultry business, sewing and/or selling fresh products that need refrigeration.

Box D: Powering Women's Production and Empowering Women Economically

Bondo village is located in the Mulanje District in southern Malawi. In 2015, the Mulanje Renewable Energy Agency (MuREA) on behalf of Mulanje Mountain Conservation Trust (MMCT) partnered with eight villages to construct the 60 kW Bondo micro-hydropower plant, which has since expanded to 220 kW. Construction was undertaken by engineers as well as community members, both women and men. The facility currently provides electricity to 1,618 households, 10 schools, 1 hospital, 8 maize mills and 117 businesses.

The arrival of electricity has been empowering for women who have used it to start businesses or expand the products and services of their pre-existing businesses. Of the eight maize mills, two are owned by women. Women also own such businesses as hair salons, tailoring shops and grocery shops that sell cold drinks, all of which have been facilitated by electricity. A few women have extended their businesses to travelling to nearby Mozambique where they buy fresh fish, freeze it and sell it in their communities, while others have invested in ovens and sell baked goods. Some women with lower levels of capital finance undertake smaller businesses, such as selling snacks, which have benefitted from home lights. In several of these businesses as well as in men's businesses, other women are employed extending income earning opportunities beyond business owners.

MEGA Ltd enhanced women's capacity to use electricity for productive uses and income generation by supporting some of them to form village savings and loan associations (VSLAs). MEGA then provided business training and facilitated access to finance with a local bank. The women in these groups provide each other with loans from their own savings and mentor each other. In total, 88 women were supported and now engage in the productive use of electricity.

II.G Changing gender narratives and roles

Gender narratives or accounts of what women can and cannot do are critical to gender gaps because they shape what women and men do, what resources and opportunities are made available to them and therefore reinforce or close gender gaps. Access to electricity can begin to challenge such narratives and change gender roles. In Mahadevsthan, Nepal, when micro-hydropower was installed, households obtained access to television and mobile phones and with these, access to different gender narratives and worldviews (ENERGIA, 2018). The advent of television meant women could see other women in non-traditional roles on television programmes, which in some cases changed their minds about career options for women. Older women in Mahadevsthan reported wanting their daughters to receive a good education and have careers such as the ones they saw on television (ENERGIA, 2018). Thumin (1999) reported that after micro-hydropower in Gundruk, Nepal enabled TV, 88 per cent of households obtained TV or radios and women reported realizing that they "don't have to remain second-class citizens".

Mobile phones whose popularity increased after electrification in Mahadevsthan, Nepal, enabled young women and men to negotiate their relationships as opposed to the tradition in the area where parents arrange marriage (ENERGIA, 2018). In this way, young women gained some level of change and reduced control over a critical part of their lives. Minor changes in gender roles were also reported as being a result of households obtaining electric rice cookers in Mahadevsthan, Nepal. Men were more likely to help cook — a job traditionally done by women — when they could use electric rice cookers (ENERGIA, 2018). While there are few studies on changing gender narratives and roles with the coming of SHP (or indeed any form of electricity) into a community, other studies on access to electricity show similar benefits. In Zanzibar, Tanzania, and South Africa, Winther (2008) and Matinga (2010), respectively, found that men were more likely to contribute to cooking when households obtained access to electricity. As in the case in Nepal, in both Zanzibar and South Africa cooking is primarily a women's task and so men's cooking represents a change in gender roles. While these changes are generally small, they may signify a critical start to a change process.

Narratives that support gender inequalities do not just change with use. When women are employed or work on SHP development or operations, communities change their perceptions of women's abilities. All women professionals we talked to for this publication who worked in male-dominated positions in SHP reported that their positions there changed narratives and perceptions, among both women and men, about women's capabilities. In the areas that SIBAT works in, in the Philippines, it trains women in management, engineering and technical areas, organizational leadership, tariff setting and others. As the women work on the SHP plants, women and men start questioning and changing their perspectives on what women can and cannot do. Many young women are inspired to work in SHP or other technical areas that SIBAT works on.

III. What stops women from benefitting from SHP?

Despite the many benefits that SHP has for women and girls and its capacity to empower women and close gender gaps, its full potential is limited by the range of gendered barriers women face in being part of the SHP sector on both the supply and demand sides. These barriers are not due to the nature of SHP but relate to the longstanding gender norms and structural barriers, which means in many societies women lag behind men in access to opportunities, incomes, assets and skills because of prevailing social norms. These barriers include:

III.A Barriers to women's leadership and participation in the planning of SHP

- The perception that SHP is technical and a domain for men.
- Lower levels of literacy among women especially in developing and transition countries.
- Lack of information regarding SHP in local and/or minority languages.
- Higher levels of time poverty among women than men.
- Difficulty to travel to meeting venues due to cultural and economic constraints.

III.B Barriers to women's employment in the SHP sector

- Gender bias in the hiring process due to emphasis on masculinity and a lack of diverse hiring teams.
- Lack of awareness among women of the range of job opportunities available in the SHP sector including non-science/technology/engineering/mathematics (STEM) options.
- Cultural expectations for women that conflict with career paths.
- Lower numbers of women with STEM qualifications compared to men.
- Limited opportunities for women to receive training, including on-the-job training, to gain skills necessary to work in the sector.
- Workplace policies that are not responsive to women's needs and cultures and are discriminatory to women, including poor workplace safety leading to poor retention.
- Lack of awareness among sector and company leaders of the gender gaps in the sector and how to address them.
- Lack of role models and mentors for women in, or wanting to enter, the sector.
- Limited opportunities for women to network and limited gender-responsive networking opportunities.
- Discriminatory labour laws that prohibit women from working at certain times or with certain machinery.

III.C Barriers to subscription[11] and access to electricity produced by SHP

- High connection fees.
- High levels of administrative burden for acquiring electricity connections (e.g., need to submit legal documents or need to prove asset ownership that women may not have at the same levels as men).
- Need to travel to far-away utility offices, often several times to get a connection.
- High costs and limited availability of appliances that are critical to women's needs.

III.D Barriers for women benefitting from the use of SHP

- The low capacity of some SHP plants (micro/pico level) can prohibit women from using power when they need it or for the appliances useful to them.
- High costs of electricity use (i.e., high tariffs).
- Household members' preferences that might exclude the use of electricity for tasks such as cooking, e.g., preference for food cooked on traditional fires.
- High costs of appliances that women need, e.g., cookers and washing machines.
- Limited business skills and access to finance to use power productively or for income generation.

III.E Threats to women and their livelihoods due to SHP development

- Poor governance of SHP development due to a lack of legal frameworks or because of poor enforcement can threaten natural resources critical for women's livelihoods.
- Poor or lack of consultation with women in prospecting, planning and implementing projects can limit the inclusion of their concerns in development planning.
- An influx of male migrant labour can increase the number of women subjected to gender-based violence and sexual exploitation.

IV. Conclusion and key recommendations for supporting gender equality in the SHP sector

Initiatives presented in this chapter show that SHP does reduce gender gaps when women are included in planning, policy-making, construction, operations and management of SHP plants or when they use the derived electricity for their needs. Impacts from the supply side primarily accrue to individual women who gain income-earning opportunities and positions that increase their participation in decision-making. Secondary benefits on the supply side result from knock-on or ripple effects of employing women or women participating in consultations and decision-making because such employment or decision-making positions begin to challenge traditional gender narratives of what women can do. While most of the supply side benefits accrue to women with relatively high levels of education, women with lower levels of education can also benefit if they are adequately supported with training and opportunities for on-the-job training. Including women in the community, consultations are also critical for ensuring that women's needs and views are accounted for in the design and implementation of SHP projects but also empower women by including them in decision-making around infrastructure development and governance, which they are often excluded from. The inclusion of women on the supply side is impactful even in developed countries where access to electricity is universal since even there, barriers exist for women entering the hydropower sector.

On the consumer side, SHP reduces gender gaps when women use electricity from SHP plants to lighten their work burdens, particularly when electricity starts replacing firewood for cooking and powers appliances and facilities critical to women's tasks, and when it creates direct and indirect employment and income generating opportunities. When SHP powers facilities such as schools, hospitals, water pumping and community centres, it not only benefits the women whose households can afford an electricity connection and appliances but also poorer women who use these facilities even in cases where they do not have household electricity.

For both supply and use benefits, intentional efforts are needed to unlock SHP's potential to reduce gender gaps. Below are some key recommendations for ensuring that SHP supports the closing of gender gaps and empowering women, and examples of efforts to reduce gender gaps.

Recommendation 1: Include women in consultations and engage with women's groups to enhance participation of women in consultations and planning

As indicated in the International Hydropower Association's How-to Guide on Hydropower Environmental and Social Assessment and Management (IHA, 2021a), the environmental and social impact assessment, as well as ongoing assessment and management, should both:

- ensure that the consultation is conducted inclusively for women and vulnerable groups, and
- clearly identify the differentiated impacts of the project on women and girls and vulnerable groups and devise management measures accordingly.

Various initiatives such as Guakía Ambiente, AEPC and AKRSP, have shown the benefits of engaging women's groups to identify women that can effectively participate in SHP-related consultations and/or take on leadership roles in SHP committees. They have used such groups as a means of identifying empowered women that can voice and represent women's interest in consultations, convening women's collective power[12] and harnessing connections that women's groups have to other women in a particular community.

Box E: Supporting Women's Participation in Decision-Making regarding Infrastructure Projects

Finding women to work on SHP plants in Pakistan, as in many other countries, is not an easy task. There are few women with qualifications and even when women are qualified, cultural and religious barriers often prevent them from joining the sector. The AKRSP has been working in northern Pakistan since the 1990s, building community SHP plants. The community schemes are partially financed by community cash and in-kind contributions, after which the community members become shareholders in the schemes. In these schemes, AKRSP supports women's participation in decision-making and quality assurance as well as to access electricity.

In AKRSP's schemes in Chitral District in Khyber Pakhtunkhwa Province, households must purchase a minimum of PKR 9,000 (USD 51) at PKR 100 per share, to be part of the scheme and get a connection. Recognizing women's lower incomes compared to men's, AKRSP set the minimum threshold for women's shareholding at PKR 1,500 (USD 8.5). This resulted in the Chitral micro-hydropower facilities having 700 men shareholders and 400 women shareholders. This means more women and female-headed households in the area can afford an electricity connection and can also participate in discussions and decisions relating to the facilities. This was a first in Pakistan and motivated the women in Chitral. Women were also appointed to the board of directors. Of the five board members, two are women. They participate with the men in making decisions, checking accounts and voting.

Recommendation 2: Get the buy-in and support of leadership, most of whom are men

The current leadership in the SHP sector is mostly male and is not always aware of gender gaps in the sector, its root causes and impacts on company or policy performance and wider society. Because those in leadership, such as managers, are responsible for making changes and signing off on investments, getting buy-in and support from leadership on reducing gender gaps at all levels in the sector is important to make relevant changes and to invest in women. For community models of SHP facilities (which are largely funded by public finance and local contributions), project implementers must create awareness among male and female community leaders on the need for closing gender gaps, through discussions, training women and, where possible, by showcasing female SHP staff or successful examples that can be adapted for that community. Organizations providing grant finance can include and finance gender targets as part of desired project outcomes.

For many private businesses, getting buy-in from leadership requires researching and showcasing the business case — where possible — for including women in various aspects of the sector, as well as the benefits of diverse talent and customer base. However, private companies may not be willing to invest in such research and so public sector funding could play a catalytic role by supporting such research as well as the initial focus, building on how to reduce gender gaps.

Recommendation 3: Showcase the business case for gender in SHP, looking beyond economics

In general, the private sector's decisions are driven by their need to improve financial performance and be competitive. Thus, for them to support women's inclusion, there is a need to show the benefits of including women in their businesses. This can catalyze private sector investments in women in the sector. However, this is challenging because the private sector may not be ready to make the initial investment. In the least developed countries (LDCs) where both job prospects and skills are low, making a business case purely based on economics can be difficult. Studies that have shown that women in leadership positions lead to improved business performance have largely been conducted in developed countries and/or high-revenue businesses and may not be transferable to LDC contexts. In contrast, most electricity companies in these countries are loss-making and/or dependent on grant financing from the donor community. As such, economic returns are not necessarily the key driver for decision-making. Similarly, other common challenges for making business cases, such as talent gaps caused by outmigration of males or ageing workforce or company reputation, may not be relevant in LDCs where there are high numbers of talented, unemployed youth, high competition for jobs and few competitive energy companies. Even when the business case is made, women may not necessarily be employed in non-traditional roles.[13] In such contexts, making a business case for the inclusion of women (a pull strategy) may have to be combined with push strategies such as results-based financing tied to gender goals. Thus, for example, loans from development banks can include the requirement to meet certain gender targets over a defined period. This strategy has been used by the Inter-American Development Bank (IADB), International Finance Corporation (IFC) and the World Bank.

Box F: Using Public Finance to Catalyze Change in the Private Sector

The IFC is a sister organization of the World Bank and a member of the World Bank Group. It supports the private sector in emerging markets through capitalization, sharing its expertise and influencing policy changes to create markets and opportunities. In Asia, the IFC's Powered by Women programme helped renewable energy companies — including those operating in the SHP space — to build the business case for gender diversity in the sector. The programme operated in Myanmar (until 2020) and Nepal. A starting point of the Powered by Women initiative in-country is to understand the status of women in the hydropower sector, the challenges they face and opportunities for enhancing gender diversity in

the sector. By doing this along with company leadership, IFC demonstrates real and contextualized benefits of including women at all levels and the risks of not supporting women's inclusion in the sector. In Nepal, the IFC has worked with over two dozen executives of 20 companies including chief executive officers (CEOs), executive directors, executive managing directors, hydropower project in-charge and human resource (HR) managers and women as well as male staff in the participating companies. A 2020 IFC-supported study in the country established a gender baseline, created awareness of the gender business case and solicited commitments from leadership in the sector. As a result of these efforts, between December 2020 and March 2021, the proportion of companies that had women board members increased from 56 per cent to 61 per cent, the number of committees chaired by women increased from 10 to 12; 10 of the 20 participating companies committed to investing in leadership training, while five companies are introducing training for women (IFC, 2021). The number of women employed in non-traditional roles across the 20 participating companies increased from 47 to 53. Other achievements of IFC's support to the 20 companies in Nepal include: training more women in non-traditional roles, developing family-friendly policies and guidelines, launching codes of conduct against bullying and sexual harassment, investing in training, awareness-raising about workplace respect and safety, holding women-only consultations as part of the environmental impact assessment process and many others. Work is also ongoing in Myanmar and similar commitments and results are emerging.

Recommendation 4: Fund and support capacity building and skills enhancement for women

Meaningful inclusion of women in the sector at any level requires that women are empowered with the knowledge and skills needed to thrive in their roles. Organizations such as AEPC in Nepal, Guakía Ambiente in the Dominican Republic, AKRSP in Pakistan and the case of Frontier Energy in Uganda show that when organizations or companies invest in building women's capacity, women effectively participate in the sector, even when their initial training is not in a STEM area. For participation in SHP planning, women must understand the pros and cons of SHP and how these intersect with their needs and interests. Women may also need support to build their confidence and agency to effectively participate in consultations. For employment, organizations could invest in women's skills with quick wins such as short-term training, leadership development schemes, mentorships programmes, internships and showcasing opportunities available in the wider SHP sector to women that work in traditional roles in the SHP sector and may be interested in transferring to non-traditional roles. This strategy was used by Frontier Energy in Uganda and East African Power in Zimbabwe where qualified women with finance backgrounds were supported in operations and management in the SHP sector and now occupy roles typically dominated by men.

In the long term, there is a need to build a pipeline of skills and talents for women that can enter and remain in the SHP sector. This could be done by providing scholarships, mentorships and creating or supporting women's professional networks. Small private companies may be reluctant to invest in such long-term goals and so public or blended financing may be required to support this. An example where public finance was useful in this sense is a UNDP project in Tanzania which supported two women to gain an MSc degree in renewable energy as part of the programme design.

Box G: Using Scholarships to Support Women's Entry into the Hydropower Sector

The Hydropower Foundation is a non-profit organization that supports hydropower and addresses issues in the hydropower sector in the United States of America. Established in 1994, it is a membership-based foundation that is funded by grants and contributions from individuals, companies, foundations, government agencies and associations. As part of its activities, the Hydropower Foundation supports workforce development including diversity, equity and justice.

In 2017, the Foundation established the Julie Keil Memorial Fund Scholarship which supports women aiming to enter the hydropower industry that is enrolled in an accredited college, university or technical school programme. The Fund also offers grants to support them with expenses to attend industry events. Since 2017, the Fund has provided scholarships and support to four women and is on track to support a fifth woman in its fifth year. Crucially, these women have been drawn from a diverse range of ethnic backgrounds.

Source: Hydropower Foundation, 2021

Recommendation 5: Create supportive spaces for women to attract and retain female talent

Given the context (male-dominated and often remote rural) in which many SHP plants operate, retaining female talent means ensuring that women's needs are catered for. As women enter and progress in the sector, their needs for work-life balance may change and conflict with working in remote areas or working in shift work. See also the How-to Guide on Hydropower Labour and Working Conditions (IHA, 2021b), which includes gender-specific guidance.

Box H: Supporting Women's Career Progression and Motherhood Challenges

Annicent Busingye, a Chief Executive Officer (Formerly Operations and Maintenance Director) at Frontier Energy — a renewable energy developer in Uganda — originally trained as an accountant and worked in the banking sector when an opportunity to work as an accountant at a hydropower company presented itself. In 2008, she joined TronderPower as a project accountant on a 13 MW hydropower plant. It is while working at TronderPower that Busingye realized the growth potential and opportunities for women in the SHP sector and so planned her journey to work in it in a different capacity. She undertook studies to achieve her goals. Annicent credits her journey in the sector to good management support from TronderEnergy and financial support from Norfund.[14] Owners of Tronder Energy allowed her the time to study and encouraged her. Norfund provided her with a grant that funded 50 per cent of a course called Female Future Programme. Such support allowed her to move to the more male-dominated operations and maintenance side of SHP. Observing the lack of women in this area, she asked managers to support other women to become operators which they did, resulting in two women operators joining TronderPower

In 2017, Busingye moved from TronderPower and joined Frontier Energy, a Danish Company that co-invests in renewable energy generation in Africa, with investments in Kenya, Uganda, Rwanda, Tanzania, Zambia, Mozambique and Malawi. Here she established their operations and maintenance department and made proposals for enhancing female employment in Frontier Energy's Uganda operations. Her first proposal to management was to have at least two women operators at each of Frontier Energy's eight hydropower plants in Uganda as well as female plant assistants. Her senior management was supportive of this plan and it has since been implemented. Frontier Energy in Uganda now has 16 women plant operators and women plant assistants.

Busingye also realized that returning to work in remote areas after giving birth is not easy for women in Uganda given that maternity leave is 60 working days. Busingye initiated a programme that allows women to bring their infants to the field site's shared accommodation, with a helper (nanny) until the baby is two years old. The first baby from this programme has now "graduated" and the mother continues to work. Other babies are on the way with their mothers supported by Busingye and another woman that was supported by this initiative.

Recommendation 6: Use innovative strategies including targeted subsidies to connect the poorest households

Various SHP initiatives have shown how subsidies for connections and other innovative solutions such as shareholding, labour contributions in exchange for connections and others can help low-income households including female-headed households to connect to electricity.

Box I: Supporting Women-Entrepreneurs to Access and Benefit from SHP

About 95 per cent of households in Nepal have access to electricity, with approximately 72 per cent of households connected to the national grid and 23 per cent connected to off-grid sources such as SHP (World Bank, 2019). SHP plants mostly provide electricity to some of the poorest and/or isolated communities in rural areas. The Alternative Energy Promotion Centre (AEPC), established in 1996 by the Government of Nepal, is tasked with the promotion, development and expansion of renewable energy technologies including SHP. Over time, AEPC has developed a gender and social inclusion (GESI) policy in recognition of the fact that women and other socially excluded groups have unique challenges in fully participating and benefitting from renewable energy. As part of this policy, AEPC uses sex-and caste-disaggregated databases and reporting. For facilitating energy access, community electrification initiatives may qualify for a subsidy to enable them to connect poor female-headed households. The electricity committee and developer are then provided with a subsidy of NPR 4,000 (USD 33) per target household — which is certified by municipalities — to enable them to connect free of charge. This approach has helped poor, female-headed households to connect to electricity and enjoy its benefits. In addition, AEPC encourages the productive use of electricity by providing financial subsidies to entrepreneurs if they can purchase equipment to use electricity productively. While there is no specific support for women under this effort, where demand for entrepreneurs' subsidies is higher than available financing, female entrepreneurs are prioritized.

Recommendation 7: Ease the administrative burdens of connecting to electricity to unlock access for poor women, female-headed households and other excluded groups

Beyond affordability of connections, reducing the administrative burden, including submitting legal documents and travelling out of a community to apply for an electricity connection, can help increase the number of poor and marginalized women, female-headed households and other groups with access to electricity. This could include using local databases or village registry to validate residence, offering alternatives for legal documents, or having a village committee make the applications on behalf of those that struggle with the process. Delinking the registration or application eligibility from asset ownership or legality is another means of increasing electricity subscriptions for women.

Box J: Reducing Administrative Burdens of Electricity Connection

In rural Pakistan, travelling to and from administrative centres for services can be expensive and time-consuming. For women, this can be made more difficult by gender norms and expectations which limit their mobility. Additionally, women's legal documents such as proof of ID, their access to assets and house ownership tend to lag behind men's. The Aga Khan Rural Support Programme (AKRSP) ensures that this context has little to no impact on women's ability to connect to electricity in the areas where they support the development and operation of micro-hydropower plants. While registration for electricity is a requirement, for those without legal documents such as some female-headed households, AKRSP allows the use of social eligibility or social guarantees instead of legal documents. For being a shareholder in the power plants, legal documents are required and for those without, AKRSP facilitates registration to acquire such documents. For women, this means not only becoming shareholders but facilitating their access to other services and spaces beyond micro-hydropower shareholding, where such documents are required. These efforts and concessions by AKRSP mean that women do not have to contend with a high administrative burden to subscribe to electricity connections. Beyond documentation, households are required to pay PKR 3,500 (USD 20) connection fees, which include electricity meter installation. For those with lower incomes, many of which are female-headed households, AKRSP allows paying the connection fee in instalments over a period of three to six months.

Recommendation 8: Create and enforce gender-responsive governance to safeguard and improve women's livelihoods

SHP plays a critical role in improving energy access and democratization of energy systems. Trends in the Balkan region, where several groups — with women playing a key role — have protested SHP development, showing the need for strong governance to ensure that SHP development remains compatible with the protection of livelihoods, cultures and habitats. In much of the Balkans, laws governing SHP development exist, but enforcement appears weak and at times, at odds with local interests. In Nepal, AEPC uses water certificates that formalize the governance of any changes to water use and safeguards water users' interests. Interests of women and men are discussed and safeguards are created and reinforced at the local level.

Box K: Safeguarding Women's Natural Resource Access and Use through Community-Based Governance

In many developing and transition countries, low-income women and rural women are often dependent on natural resources for their livelihoods including providing food and water for their families. Riverine ecosystems often are an important resource for women, providing land for small vegetable gardens that women own or manage and water for irrigating the gardens as well as for domestic use. While SHP development rarely results in resettlements or water use changes, having safeguards for resource use is a useful way of protecting women's needs and interests around riverine areas where SHP developments are occurring.[15] In Nepal, the Alternative Energy Promotion Centre makes the safeguarding of such resources part of consultations. During consultations, women and men articulate their water needs and this is used to define access to water around hydropower developments. It ensures that the interests of both women and men regarding water are taken into account. For women, this can be especially useful for ensuring their continued water drawing rights.

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Appendix 1: List of interviews conducted

	Organization name	Name of interviewee (s)	Category /Role	Location	Date of interview
1	AEPC	Chaitanya Chaudhary	Senior Officer and Head of Community Electrification Section	Nepal	22/12/2021
2	AKRSP	Merhaba Khan	Programme Manager	Pakistan	21/11/2021
3	Azurit Engineer and Environment	Joanna Cruz	Engineer	Brazil	08/12/2021
4	East Africa Power	Agnes Chiweshe	Chief Financial Officer	Zimbabwe	14/12/2021
5	EREF	Dirk Hendricks	Policy Expert	Belgium	09/12/2021
6	Guakía Ambiente	Michela Izzo	Project Manager	The Dominican Republic	06/12/2021
7	GWNET	Barbara Fischer Aupperle	Advocate/Mentor	Germany	19/11/2021
8	IADB	Amanda Beaujon Marin	Gender expert	Panama	08/12/2021
9	IFC	Ellen Claire Maynes	Gender Equity, Diversity & Economic Inclusion	Papua New Guinea	12/11/2021
10	IFC	Kate Lazarus	Senior Asia ESG Advisory Lead at IFC - International Finance Corporation	Myanmar	17/11/2021
11	IHA	Debbie Gray	Climate Policy Manager	Canada	11/12/2021
12	Individual	Jade Angngalao	Engineer	Philippines	12/02/2022
13	MAGIRO Hydropower	Lilian Kagoche	Finance and Administration Manager	Kenya	10/02/2022
14	MEGA	Alfred Kadziponye	Manager	Malawi	11/02/2022
15	RENAC	Emilienne Tingwey	Project Director	Germany	07/02/2022
16	SIBAT	Estrella Catarata, Benazir Bacala	Director Engineer	Philippines	16/02/2022
17	SKAT	Hedi Feibel	Energy specialist	Switzerland	29/11/2021
18	UNDP (Consultant)	Komal Hassamal	Senior Climate Finance Expert	United Kingdom	17/11/2022
19	UNIFEI	Geraldo Lúcio Tiago Filho	Academic	Brazil	25/11/2021
20	WECF	Katharina Habersbrunner, Marilys Louvet	Community Energy Advocates	Germany	13/12/2021

Endnotes

1 A gender approach analyzes the different social norms, roles, opportunities and interactions that impact women and men, and designs policies and initiatives that seek to close the gaps in opportunities between women and men and empowers women.

2 The definition of SHP by capacity varies from country to country. For this report, the definition is taken to include all hydropower plants up to and including 10 MW.

3 The frequency of laundry task is not reported in the report.

4 The initial 33 per cent subsidy (which was gradually reduced over time) reduced costs of 3 litre (USD 13) and 8 litre (USD 20) electric cookers (Bell, 1994).

5 Assuming one electric cooker per household, this would be 30 per cent of households. Assuming two cookers (food cooking and water heating) per household, then 15 per cent of households would have these buliji dekchis. Given the slow uptake of clean cookstoves globally, either of these would be considered a rapid transition.

6 Gabunada et al. (1995) estimate that hand pounding takes women an estimated 26 minutes per kilogramme compared to 1 minute for electric micro-mills. Additionally, hand pounding is strenuous and is time-consuming for both the hand pounding and the winnowing required afterwards. Winnowing is not required in electric milled rice. Electric milling also results in better quality rice (less breakage) and is often favoured by buyers, fetching better prices.

7 Magiro has since expanded and now operates 3 hydropower plants totalling 62 kW in Murang'a county in Kenya.

8 This increases to 63 per cent in sub-Saharan Africa.

9 While both women and men use healthcare services, women are often the ones responsible for household and community healthcare provision and are therefore likely to be more negatively impacted by lack of services than men.

10 The clinic offers admission for maternity services only. All other patients are treated as outpatients.

11 The process of submitting legal documents or otherwise meeting criteria and in some cases, paying so as to access a service or product, in this case, an electricity connection.

12 The groups can bring more women to the consultations or bring in their collective stance.

13 For example, one aspect of business case is often to improve revenue collection. Pay As You Go (PAYG) systems have reduced this challenge but even when it exists, this only leads to employing women as revenue collectors or vendors which is hardly breaking into traditionally male roles.

14 Norfund is the Norwegian Investment Fund for Developing Countries. It is a state-owned fund that invests equity and/or debt capital with the aim of supporting poverty reduction and economic development in the poorest countries, primarily in Sub-Saharan Africa as well as selected Asian and Latin American countries.

15 For projects requiring resettlement, the How-to Guide on Hydropower Resettlement (IHA, 2020) provides gender-specific guidance.

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