

The Value of Engaging Women in the Energy Provisioning Process

ENERGY PROVISIONING THROUGH
INCLUSIVE COLLABORATION (EPIC)

A Case Study on the Shramik Bharti Experience

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1. Introduction

The problem of energy access or in fact of energy poverty lies at the core of the global developmental challenge today, as 83 per cent of humanity—over 6 billion people—still live in poor economic and social conditions. This worsening human suffering is based on a lack of energy, because energy is the driving force of development and modernity (Clemente 2015).

As the world prepares to transition from the Millennium Development Goals (MDGs) to the Sustainable Development Goals (SDGs), access to sustainable, affordable, and reliable energy becomes an even more critical pre-condition to eradicating poverty and achieving sustainable development. The World Bank's latest report, based on the second edition of the SE4All Global Tracking Framework (GTF 2015), estimates that 1.1 billion people worldwide are still living without access to electricity, with highest concentrations in Africa and Asia. Another 2.9 billion rely on wood or other biomass for cooking and heating, resulting in indoor and outdoor air pollution, attributable to 4.3 million deaths each year (SE4ALL 2015). Although there has been a positive decline of 0.1 billion in the number of people without access to electricity, in the case of access to clean cooking alternatives, there has been negligible progress overall, and despite concerted efforts in making such alternatives available and accessible globally, the number of people using traditional solid biomass fuels for cooking have largely remained the same.

Much remains to be done in this scenario, as the continued lack of access to energy severely undermines health, inhibits education, limits livelihood opportunities, and reduces the chances for the poor to rise out of poverty, ultimately diminishing the world's chances to successfully achieve the SDGs by 2030. Even though global efforts are headed in the right direction to end energy poverty, the rate of interventions is far behind the population rate of growth and calls for dramatic accelerations in mobilizing resources to increase access to renewable energy alternatives.

1.1 Women and Energy

Women are a key, though underutilized, resource in the energy service delivery process. Primarily viewed only as energy consumers, in the majority of affected regions it is the women that experience energy poverty much more severely than men (UNWOMEN 2014). There are clear correlations between poverty, the lack of access to energy, and gender inequality as it is well known that men and women in developing countries have differing roles and responsibilities, which is reflected in their energy needs and priorities (ECREEE 2014). In most BoP¹ communities across the world, the entire burden of providing for a family's energy needs falls on women. In the absence of modern sources of energy for lighting and cooking, women spend nearly 40 hours a month collecting fuel wood, which ironically, when used to cook over open fires causes her and her family to develop severe respiratory and lung diseases. On an average, women endure 14-hour long work days to fulfill just the basic needs of their families, that is, fetching water (which requires them to walk several miles every day) and providing food (Cecelski). With no time, energy or opportunity to pursue any developmental or livelihood activities, women remain confined to their homes, making it nearly impossible to break free from drudgery and poverty. Forced into lives of dependency and subordination, as non-earning members, they end up having limited or no decision-making powers and are allowed lesser and lesser access to education, credit, land, and power (Cecelski).

¹Bottom of Pyramid

The energy sector has largely been viewed and approached as a capital-intensive, large-scale, and commercial space where energy service delivery followed a bullish supply driven approach. **However, in the process, most initiatives treat women as merely recipients of the intervention and fail to factor in the 'female' gender's dimensions that may actually influence and reveal the effectiveness and sustainability of the solution.** Policymakers in most countries remain gender blind as well, failing to include women in the development of energy policies or to draw on their local knowledge and influencing capacity to drive adoption within households and communities (Maria Robinson Foundation, Climate Justice 2012). Therefore despite their enormous potential, in the absence of active consultations with local women, many clean technologies fail to succeed simply because women's needs and interests have not been considered (Kirrin Gill 2012). For instance, in the case of Shramik Bharti,² the first clean cookstove model introduced into the market, a top loading improved steel stove, was expected to be a market changer as a sophisticated, durable, attractive, and efficient cookstove. However, because the manufacturers developed the stove in isolation of the end user perspective, failing to take into account usage patterns and preferences of the end user who were primarily women, they misfired on key technical and economic aspects that rendered the cookstove a complete failure.

Another factor that inhibits or limits women's mainstreaming into the energy sector is the lack of awareness on how to plan and implement clean energy services in a manner that actually address women as more than mere recipients (Clancy 2010). By employing women in the delivery of energy, a traditionally male sphere can change perceptions of their capabilities and potentially challenge existing norms surrounding the gendered division of labour.

This study therefore seeks to demonstrate the value of engaging women actively in the energy provisioning process, such that each aspect of the role played by them not only has a favourable impact on women's empowerment socially and economically but also enables the overall intervention to be more effective and far reaching. For example, training local women in promoting and demonstrating clean lighting and cooking technologies not only enhances information dissemination and awareness generation but also brings in familiarity and a level of trust in the prospective end user community, leading to faster sales conversions and higher adoption rates. The model recognizes that women and girls are disproportionately and more severely affected by the lack of access to energy, and specifically works to include them as active participants in the delivery of clean energy solutions. **In Shramik Bharti's case, women SHG groups are engaged to involve women as consumers as well as diffusion agents in reaching a larger end user mass and to accelerate the last mile delivery of clean energy solutions.** The case also reinforces that for microfinance as a means of lending, women are generally better credit risks and have better repayment rates than men—making them well suited to be part of a sustainable collection system that supports a continuous and expanding energy provisioning process (Kathleen O'Dell 2014).

2. Barriers to Adoption

Even though renewable energy-based solutions have enormous potential, realized over time at reasonable costs, most initiatives and commercial ventures in energy access face significant market

²Shramik Bharti is a Kanpur-based NGO that works for the upliftment of rural and urban communities in Kanpur and Kanpur Dehat. The NGO collaborated with TERI in 2012 to deliver clean energy solutions to its member communities.

barriers that lead to market failure or very limited market penetration, making the overall business viability of the solution negligible and therefore unsustainable.

First, technically called a **commercialization barrier**, this is where the product must compete with established traditional methods of energy consumption. Essentially, it is the consumer's behaviour or his 'resistance to change' that makes it difficult for a new technology to break into an established market.

Second, the **lack of adequate information** leads to the subsequent failure of the product. Since renewable technologies are relatively new, customers know very little about the product, its benefits, and functional properties in order to make informed choices. Most utilities provide little or no information about emissions or the fuels they use. Many customers, for example, may think that solar technologies are unreliable because they are available only when the sun is shining (UCS 1999). Potential customers therefore need to hear/see consistent messages about the merits of a solar solution from reliable sources so that they are confident to make the purchase. It is also important to communicate relevant technical information regarding safety, equipment protection, power quality, and reliability of service (R. Margolis 2006).

This is where the EPIC Model was able to significantly overcome awareness and technology information issues by leveraging Shramik Bharti's monthly SHG federation meetings as platforms for information sharing. Shramik Bharti works with over 2,500 self-help groups, where each group consists of an average of 10 members and 100 groups make a federation. Federation meetings offer the opportunity to address a captured and invested audience of nearly 1,000 people at a time to share product details, demonstrate, and explain the socio-economic and health benefits of using cleaner lighting and cooking technologies. Supporting handouts in the form of flyers and illustrative posters also played an important part in communicating with the end user mass and in creating subsequent demand.

Third, even when a renewable energy solution does reach rural markets, a number of **financial barriers** inhibit its adoption. On the demand side, low income levels and the lack of access to formal lending organizations translate to lower affordability and lower buying capacities. On the supply side, small energy entrepreneurs, who can lend valuable market penetration, find it hard to set up and run an energy based system profitably due to limited access to capital or very high costs of raising this capital. Lending institutions also lack familiarity and adequate information on the sector to feel reassured of their financing decisions in renewable energy and energy efficiency projects (CCAP n.d.).

Fourth, the **lack of infrastructure, technical standards, capabilities, and a sound knowledge base** further undermines the proper development and sustenance of clean technology solutions and markets. This includes the presence of trained local technicians to deal with maintenance issues and after-sales services that contribute largely towards the reliability of solar solutions.

The successful adoption of a clean energy solution therefore requires certain 'conversion factors' to be addressed that—convey the technology's value proposition, dispel its perception of unreliability, and simplify the purchase process—to eliminate end user insecurities and purchase indecisions. The role of women in energy service delivery will significantly enhance the level of adoption and augment the process further by strengthening the energy delivery process at the last mile; and must therefore be recognized and mainstreamed into the larger energy provisioning effort.

3. Energy Provisioning through Inclusive Collaboration (EPIC)

Mainstreaming Women into the Energy Delivery Process through Institutional Enabling and Role Definition

Participatory processes are important requisites in mainstreaming women into the energy access value chain. But more importantly it is the form of participation that is devised over and above the mere presence of women that will define true gender inclusion (Clancy 2010). Women's particular roles in their families and communities, as well as their credit risk profile, make them potentially more suitable and effective than men for specific roles within the energy access sector. In turn, this helps women to benefit from new employment opportunities and higher incomes and creates positive implications for the community at large (Kathleen O'Dell 2014).

The EPIC Model works on a simplified premise that identifies specific roles for women—to facilitate last mile disseminations and the serviceability of clean lighting and cooking technologies. Keeping in view the commercial viability of the clean energy intervention and the social objective of inclusion and empowerment, the Model effectively involves and enables grassroots institutions to function as commercial energy enterprises and women as active participants in the energy provisioning process, creating a gender sensitive value chain and an empowerment opportunity that manifests itself through enterprise and skill development, the disintegration of gender stereotypical roles, and positive societal transformations.

3.1 Institutional Enabling

At the institutional level, The Energy and Resources Institute (TERI), with support from UK Aid, collaborated with Shramik Bharti to deliver clean energy solutions in designated project areas of operation. *It may be emphasized that an essential prerequisite to a successful women centric energy provisioning programme could be the availability of a well-grounded grassroots organization with easy access to these women and communities.* As an NGO that worked for the empowerment and development of women and children, Shramik Bharti was a well suited candidate for this model, and brought with it access to a network of over 30,000 women through its 2,500 self-help groups (SHGs) established over the years.

- In its role as a principal enabling institution, **TERI's** primary focus was on facilitating access to clean energy solutions. For this it operated as a business advisor, a technology partner, and an incubator for rural energy enterprises. TERI also worked on developing a local network of grassroots agents to enable the successful last mile delivery of clean lighting and cooking solutions.
- **Shramik Bharti**, on the other hand, functioned as a commercially-driven energy enterprise (EE) responsible for facilitating on ground implementations through the acquisition, installation, and follow up maintenance of equipment, as well as for making its SHG groups accessible to TERI for mass promotion of clean energy alternatives and for the inclusion of these women in the implementation process. As an EE, Shramik Bharti was provided specialized technical training and skills by TERI to sell, maintain, and service a comprehensive range of clean lighting and cooking solutions including solar lanterns and solar charging stations, solar micro grids, independent home lighting solutions, improved cookstoves, and integrated domestic energy systems. Also, besides earning profits as a commercially operating energy enterprise, the NGO

was financially incentivized by TERI for every product installation, its after-sales servicing as well as for maintaining the functionality of existing solar charging stations and solar micro grids in its areas of operation.

3.2 Individual Empowerment

At the individual level, TERI initiated the engagement process with Shramik Bharti's SHG members at their monthly federation³ meets. Live demonstrations of solar cooking and lighting products were conducted and information was shared with members through flyers and banners to promote the benefits of transitioning to clean energy alternatives. In this way, supported by Shramik Bharti and the community's trust in them, TERI was able to access the potential end user community and start installations of clean lighting and cooking solutions in a few households. **Once a substantial level of awareness was created and subsequent demand generated, the focus on women as merely recipients of clean energy solutions was then shifted to involving them in a more participative and inclusive role in the provisioning of energy services.** It was also collectively decided by Shramik Bharti and the SHG members to nominate women from their groups, who were either differently abled or more disadvantaged than other members in the group, and therefore in a greater need for upliftment and empowerment. This included women who were physically or visually challenged, widowed, or otherwise economically very weak with the added burden of supporting large families.

The chosen women were then assigned the following roles, supplemented with trainings and technical capacity building exercises in collaboration with Shramik Bharti.

3.2.1 Village Level Entrepreneurs (VLEs)

Most women who were unanimously nominated by their SHG group members came from extremely socially and financially deprived sections of the community. Training for these candidates was customized and simplified keeping in mind their educational and social limitations as well as their physical disabilities. As VLEs, these women managed a solar charging station⁴ or a solar micro grid⁵ installed in their homes, in return for daily/monthly rentals, respectively.

Under the TERI-Shramik Bharti clean energy programme, a total of 132 VLEs have been appointed so far, of which 104 (79 per cent) are women. With each VLE managing a solar charging station supporting 50 lanterns or an SMG providing lighting connections to 50 households each, a total of 6,600 households gained access to and benefited from clean lighting. This converts to nearly 33,000⁶ lives impacted positively through the availability of simple clean lighting solutions in the form of solar lanterns and SMG connections.

³A federation consists of about 100 SHGs, with each SHG constituted of 10–12 members.

⁴The **solar charging station** (SCS) is a clean lighting solution developed primarily to address basic lighting requirements for people who are not able to afford even kerosene lamps or candles. An SCS consists of five solar panels with capacities of 50 to 80 peak watts (Wp), and 50 LED or CFL solar lanterns which are simultaneously charged to provide lighting for 5–6 hours daily. The lanterns are rented out to households or small shops on a daily or monthly basis. Suitable for use indoors as well as outside, the solution brings flexibility to the end user, allowing them to take a lantern on hire only when required and paying only for what they use.

⁵A **solar micro grid** (SMG) is a fixed, centralized installation of photovoltaic power panels that serve connections of two light points and a mobile charging facility across 50–80 households in a village, SMGs are well suited for households or shops situated close to each other or in a cluster, the solution is modular and flexible and can be expanded in scale as necessary. The connection to an SMG provides the end user with 4 to 5 hours of clean and bright lighting.

⁶Taking average household size at five members per household.

Village Level Entrepreneurs	No. of Villages with VLEs	SCS Established	SMGs Established	Total No. of HHs Impacted	Total No. of Lives Impacted
Women	104	102	2	5,200	26,000
Men	43	9	19	1,400	7,000
Total	147	111	21	6,600	33,000

While all VLEs, men and women, drew benefits from managing the SCS or SMG systems, for the 104 women who were appointed and trained as VLEs, it was a significant economic and socially progressive development. The average rental rate of USD 0.05 per lantern per day, earned the VLE total collections of approximately USD 78 a month, which at this economic strata is a significant amount not only in terms of value but also in terms of the regularity and the assurance of a steady income every month. Through this appointment and with the newly generated income, every woman VLE was able to fulfill some form of a basic need that was otherwise harder to achieve, including household level requirements, medical expenses and nutritional requirements.

Some VLEs even demonstrated enhanced entrepreneurial qualities and higher levels of confidence, making investments in alternative livelihoods like small tea shops or daily needs shops that were collectively managed by the family and became an added source of income. Other women VLEs were now able to invest in the acquisition of assets like a house or land or small equipment for productive use.

CASE: Rasulan, a visually impaired girl who was nominated by her group to become a VLE



Like her four brothers, Rasulan was born blind. Her large family of 7 with limited means, had no physical assets like land, agricultural machinery or any form of employment that could have ensured a steady and reliable flow of income. To support their family, Rasulan’s parents worked as daily wage laborers and were barely able to meet their basic needs for survival. When Shramik Bharti discovered Rasulan and her family’s case, they encouraged her to become a member in one of their self-help groups (SHGs). They also tied up with a local medical institution for the visually impaired and worked with Rasulan and her four siblings to provide them basic levels of education and specialized training to be more independent and productive. As a result, Rasulan and her brothers developed a sense of confidence and became more interactive with the outside world.

Following this, Rasulan was nominated by her SHG group members to be appointed as VLE under TERI’s clean energy programme, to run and operate a solar charging station. Becoming a VLE enabled Rasulan to turn into an earning member in her family and despite her visual impairment, she was able to bring in a regular source of income that allowed her family to fulfill their basic requirements as well as set some money aside in savings.

These savings were then judiciously invested in setting up a small daily needs shop, the operation of which was jointly handled by all members of the family, and the revenues from which provided them with the chance to break out of their helpless and poor living conditions, to that of a more dignified and respected one.

Rasulan's story is a simple but powerful example of the positive and empowering outcome of women's inclusion in the energy access value chain. It demonstrates the need for the identification of roles, simple as they may be, such that the ripple effect of women's participation not only strengthens the delivery of energy services, but also results in the development and empowerment of the community as a whole.

3.2.2 Clean Energy Operatives (CEOs)

As TERI's clean energy implementations progressed, people became more and more familiar with the benefits of clean energy solutions and huge demands for independent solar home lighting systems⁷ started being received. While the VLE solar lantern programme successfully addressed the community's basic lighting needs, the demand for standalone home lighting systems at the household level became prominent; a need that was not met at the VLE's level thus far.

For TERI, this came as an opportunity to not only serve an eager and growing end user base with a solution upgrade but also as a platform to address cooking energy needs as this was the second most prominent area of energy use in the house. For Shramik Bharti too, this was an opportune opening to address health issues related to in-house air pollution. In its role as the primary energy enterprise, this also allowed Shramik Bharti to introduce a diversified product for its SHG members as well as to the larger community that served both lighting and cooking energy requirements.

The **Integrated Domestic Energy System⁸ (IDES)** was thus developed as a unified product solution to address the twin objectives of clean lighting and cooking. The IDES was constituted as an integrated system that included an improved cookstove, solar panels, two light points, and a mobile charging facility. While the lighting components were standardized according to a household's needs, the improved cookstove was designed to provide up to four hours of



cooking time in a day, reducing indoor pollution by nearly 30 per cent, effecting higher fuel efficiency as well as faster cooking times. TERI leveraged Shramik Bharti's SHG network to incorporate the IDES into the existing energy provisioning programme—sensitizing women's groups about the combined health and convenience benefits of the integrated system and the economics of transitioning from conventional and fuel intensive cookstoves to more efficient and reliable alternatives.

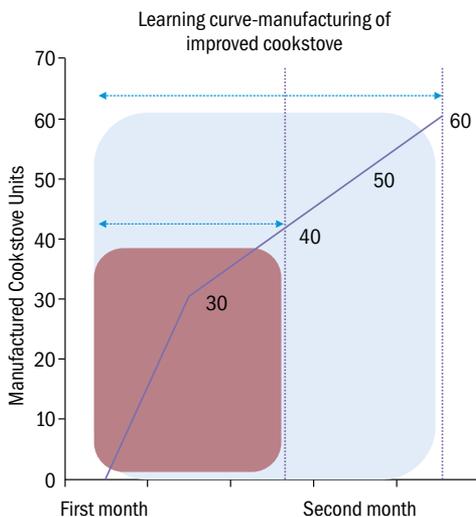
⁷ A Solar Home Lighting System (SHLS) is an independent system installation that can be customized and configured to serve specific requirements and consumption needs of households and small shops. The system runs on its own solar panel and supports two to three light points and a mobile charging facility. End users may incorporate a small solar fan or television into the system by modifying the panel size and battery backup. The system is also well suited for isolated homes in rural belts that are too far away to receive a solar micro grid connection.

⁸ A hybrid version of the SHLS, the Integrated Domestic Energy System (IDES) is an integrated system that provides a clean cooking solution in addition to a solar panel, two light points and a mobile charging facility. Developed to address the other major concern of indoor air pollution in rural households, the system addresses basic lighting and cooking energy requirements and reduces emissions by 30 per cent. The forced draft improved cookstove is improvised based on locally available materials and adapted to suit the region and usage behaviour and is designed to provide four hours of cooking time in a day.

To channelize efforts in the promotion, production, and adoption of the improved cookstove as part of the larger clean lighting solution—women were appointed as ‘clean energy operatives’ (CEOs)—and were trained to manufacture improved mud stoves locally; install them in homes; and provide basic technical assistance and follow up services.

Due to their direct involvement in the production and installation of improved mud stoves, these women also proved to be very effective promoters of the technology, demonstrating influencing capacities as known members of the community and having access to the target energy end user within the household, the women.

With proper training and skill development, these women CEOs displayed a steady upward learning and efficiency curve and within two months of joining the programme, doubled their production output from an average of 30 improved stoves a month to over 60 improved stoves in a month.



CASE: Gudiya, a widow trained to be a technician



Gudiya, a young widow and mother was unanimously chosen by her group to be trained as a technician. Gudiya had received basic elementary education which she leveraged to monitor the group’s interlinkages. After being trained by TERI as a technician, Gudiya started providing local technical support to the improved cookstove (ICS) programme. She was able to hand hold the women manufacturers in designing technically correct mud stoves on a day to day basis which immensely added value to the quality of mud stoves manufactured and helped in incorporating correct procedures in the ICS programme. Seeing Gudiya’s commitment, and efficiency, her ability to learn and implement as well as her pro activeness, Shramik Bharti decided to appoint her as a ‘book keeper to manage the day-to-day financial transactions of the SHG programme. The transition from being only an SHG member to becoming a trained technician and then a financial book keeper was both economically and socially for Gudiya <AQ>, who is now a confident woman, an independent bread winner for her family, and a respected woman in her community.

4. Impacts of Energy Provisioning through Inclusive Collaboration

Women can make significant new economic contributions in the energy sector as participants in the energy value chain. In Shramik Bharti's experience of driving the energy provisioning process by primarily engaging women in the promotions, installation, and dissemination of various technologies, the programme saw several value additions in the design evolution of technology, the influence on purchase decisions towards clean technology products and in the overall socio-economic empowerment and upliftment of women and the wider community.



4.1 Accelerating the Conversion of Inputs in Design and Utility of Technology

Women's empowerment is closely linked to efficient energy solutions. Women in developing countries can benefit significantly from improved access to energy through cleaner, more efficient stoves and fuels. However, a few women are currently employed in the formal energy sector, and there is considerable room for expansion of women's engagement in energy enterprises and supporting institutions. Women can make significant contributions in the energy sector as stove producers, briquette makers, masons constructing biogas systems, and as promoters and marketers of efficient energy technologies (ECREEE 2014). **In the case of Shramik Bharti, women were the catalysts that expedited the technology evolution and improvement process, specifically in the case of improved mud stoves.**

Introducing clean cooking alternatives has not been easy, because any improved or modern energy option has to compete with non-expensive traditional cooking methods, in this case, stoves similar to a three stone fire, which require small investments and have negligible operational costs. Even though improved cookstoves have been in the market for some years now, their technology is still in a state of evolution with several adoption issues that make it hard for them to gain acceptance with the rural poor. As manufacturers developed models that were technically efficient fuel burning machines, the 'one size fits all' concept failed to take into account diverse functional and cultural

preferences—making it a difficult product to introduce and disseminate into all markets. Other key concerns included, finding a willing manufacturer to produce stoves on a large scale, setting up dedicated supply chains and assembly lines, keeping costs to a minimum and getting assured buyers.

In Shramik Bharti's area of operation, the first clean cookstove model to be introduced was the top loading steel stove, which failed due to both technical and economic complexities. Technically, the cookstove failed to gain acceptance because it forced end users to change their cooking style drastically. Fuel wood had to be chopped into specific sizes and loaded into the stove from the top instead of from the front. This meant that they had to constantly shift and move the utensil to load the fuel. Economically, the steel stove was an expensive commodity and combined with its technical shortcomings, the product overall did not deliver the desired value. This forced TERI to improvise and introduce a compact front loading mud stove, which was an improvement on the steel stove but still remained unsuccessful due to its small combustion chamber, which did not suffice cooking for an average sized family. So in the next stage, when a larger chambered front loading mud stove was developed, it proved to be successful and well accepted as it addressed almost all technical and economic issues presented by other models. The key aspect in this case is that the decision-making process for TERI's stove development and improvement was expedited because of women being more involved, which would otherwise have been a longer process.

4.2 Improving Women's Decision Making Powers (Specifically Purchase and Investment Decisions)

In most cases, women remain deprived of access to formal banking and financial services and loans are generally taken by men, implying that the purchase decision or loan utilization decision will more often than not lie with them. Financial inclusion therefore entails the process of ensuring access to financial services and timely and adequate credit to women at an affordable cost. The lack of access to formal financial institutions due to various factors puts women as end users and village level entrepreneurs outside the banking periphery. For example, different types of terms and conditions and account opening regulations imposed by banks to protect their credit interests often prevent women in rural areas from opening a bank account. The primary requirement of an identity proof which most often people in rural communities do not possess also makes them illegible for loans (RBI 2013).

Increasing women's access to finance through microfinance services can lead to women's economic empowerment through enabling their decisions about savings and credit use and by enabling them to invest in their own economic activities or play a more controlling role in household activities. This may increase productivity and the income under women's control, and increase women's engagement in the market (ADA Dialogue 2007).

For Shramik Bharti, the financing of clean lighting and cooking products was carried out through the SHGs and therefore ended up in the hands of the women. Also, through this model, banks didn't have to deal with individual borrowers and their small ticket loans, and instead were more willing to lend a larger sum to Shramik Bharti as a collective borrower and more credit worthy entity.

4.3 Women's Economic Empowerment—Money in Women's Hands

One of the most pressing challenges to sustainable development is the pervasive inequality and discrimination that women and girls face. Across sectors and issues, and regions and countries,

evidence suggests that sustainable development strategies that do not promote gender equality and the full participation and empowerment of women and girls will not succeed (ECEEE 2014).

Microfinance is a mechanism that does not only have an effect in matters relating to the fight against poverty in the strict sense. It may also serve to push 'empowerment'—amongst the poorest of the poor, namely women. Through its contribution to women's ability to earn an income, microfinance-based programmes can potentially initiate a series of 'virtuous spirals' of economic empowerment, increased well-being for women and their families, and wider social and political empowerment. Women have also more often proved to be better savers than men, better re-payers of loans, and more willing to form effective groups to collect savings and decrease the delivery costs of many small loans. Targeting women therefore improves the financial sustainability of microfinance programmes (ADA Dialogue 2007).

In working with the self-help groups of Shramik Bharti, this is precisely what was intended and to a large extent achieved. With a healthy history of inter-loaning as a record of their creditworthiness, ensuring access to finance for the so called 'non-bankable' poor became highly possible under the model.

On the supply side, as discussed above, VLEs and 'CEOs' were unanimously chosen by the group and a loan was provided to the nominee as seed capital to set up the solar charging station or to procure raw material for cookstove manufacturing. On the demand side as well, most SHG members took a loan from their groups to buy clean energy products and the decision of who was to be given a loan was also collectively taken by the group—based on her requirement and repayment capacity. Women as end users were also able to instantly acquire a solar solution against her loan from the Shramik Bharti EE, with easy repayment installments.

TERI contributed 50 per cent of the interest component on the loan amount. This interest relief reduced the financial burden of interest repayments for the end user and increased the rate of loan uptake by other potential users as well. Shramik Bharti for its part relaxed certain inter-loaning conditions as well. For example, it allowed members with existing loans to take an additional loan to buy a clean energy product. However, for members who chose to bear the entire cost of the solar product themselves, the Shramik Bharti EE had to be paid in full at the time of the purchase. In this way, a cash supply was ensured and SHG inter-loaning for cash-strapped members was promoted. As the programme scaled up, Shramik Bharti also took a loan from the local bank to provide its SHG members with more financial credit. These loans are already in their repayment cycles and will be cumulated for repayment as installments to the bank as well.

4.4 Women CEOs as Agents of Change

Women are caretakers of resources, their families, and their communities, and tend to invest their earnings in the health and nutritional status of the household and in schooling for children. This means that the effect of targeting women's economic empowerment through access to energy and through inclusion in its provisioning will have a greater positive impact on social and economic development, child poverty reduction as well as human security (ADA Dialogue 2007) (ECEEE 2014). Since women's energy contributions are largely in the informal sector, and women are generally constrained in their roles in the social, economic, and political spheres, they are limited in their power and participation in making decisions regarding the development and implementation of energy policies, mechanisms, and investments. As a result, their energy priorities, including their needs for cleaner,

more efficient fuels, and equipment for household and productive uses, are rarely considered in decisions made in the energy sector (ECREEE 2014).

The EPIC Model works on the premise that there is a need to draw on both women's and men's perspectives to inform energy provision strategies by securing women's participation in all stages of decision making. By expanding women's roles from mere beneficiaries or recipients of clean energy solutions, to 'clean energy operatives' (CEOs) as promoters, technicians, and manufacturers, women were able to produce higher adoption rates and better and quicker technology innovations which translated into improved community level fulfillment of lighting and cooking needs as well as a more market friendly perspective that strengthened the energy value chain and made it more relevant.

5. Recommendations & Conclusion

Growth and development specifically in energy poor nations cannot be achieved without women's participation and since their contribution to economic development is vital for the overall achievement of sustainable development, there is a need for a proportionate and gradual increase in their involvement in the energy provisioning process. By working with a women's collective in the form of SHGs, it was possible to reach and enable several women within a community at the same time and to enhance their participation, decision making, and derived benefits from the clean energy provision programme. Women involved in the process became key contributors in the democratic, economic, socio-cultural spheres of life, and in sensitizing other women to take an active part in the socio-economic progress of their households and communities.

Women play a pivotal role in energy access and the advantages of involving women as energy providers are manifold, especially in the off-grid lighting sector, where the successful provision of energy services directly impacts the all-round social development and environmental sustainability. In failing to consider the gendered divide in activities that involve energy use would render any intervention or policy ineffective. Therefore, only by understanding and incorporating the concerns and contributions of women in the energy access provisioning process can better policy and programmatic design be developed, to increase access to clean decentralized lighting and cooking solutions, and to create a sustainable energy access solution. It is required that at the policy level, women are recognized as prominent and critical stakeholders in energy projects and their participation at all levels of decision-making must be encouraged. Going forward, there is a need for governments to develop gender-aware and gender-equal approaches to energy policy that promote cleaner, more efficient energy systems for all.

With regard to financial access, there is a need to mainstream gender equality and women's empowerment across all 'credit plus' activities and other such enabling mechanisms to help women graduate from small to larger loans based on their credit records. It would also be valuable to encourage microfinance institutions already working on strengthening women's networks to provide capacity building inputs with specific attention on 'gender' during group design, training, and support. These can be further augmented by helping such institutions design programmes that enable women to set up profitable household enterprises that help them grow out of small loan sizes and in turn contribute to the prosperity of the group. For example, training to help women effectively plan their finances, protect their interests as consumers and investors, and encourage their participation in financial decision-making at the household level.

A combination of women's increased economic activity and increased decision-making in the household led to wider social and political empowerment. The positive effects on women's confidence and skills, expanded knowledge and support networks through group activity, and market access can lead to enhanced status for all women within the community. In some societies, where women's mobility has been very circumscribed and women previously had little opportunity to meet women outside their immediate family, there have been very significant changes. Individual women who gain respect in their households may then act as role models for others leading to a wider process of change in community perceptions and male willingness to accept change (ADA Dialogue 2007). Women's economic empowerment at the individual level has potentially significant contributions at the macro-level through increasing women's visibility as agents of economic growth and their voice as economic actors in policy decisions. This, together with their greater ability to meet household well-being needs, in turn, increases their effectiveness as agents of poverty reduction (ADA Dialogue 2007).

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