

Integrating Women in the Clean Energy Supply Chain: Identifying Patterns and Barriers to their Inclusion Using Case Studies of Clean Energy Projects in India

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Keywords: *Gender; Clean Energy; Supply Chain; SDGs*

Introduction

The 2030 Agenda for Sustainable Development provides a holistic approach to development by integrating its social, economic and environmental dimensions, and making the process participative by engaging all the relevant stakeholders, including women, and implementing the principle of “leaving no one behind.” While the SDGs recognise the importance of gender equality (SDG 5), and clean and affordable energy (SDG 7) separately, there exists a gender-energy nexus which makes the two goals mutually reinforcing. The gender-energy nexus arises because of different energy needs of men and women due to gendered roles and responsibilities in the household and society. Women share a disproportionate burden of domestic chores like cooking, and therefore energy becomes their primary responsibility in a household; most of which is obtained from traditional biomass fuels such as wood, charcoal, and agricultural wastes due to lack of access to cleaner forms of energy.

Such dependence of women on traditional fuels is a cause for concern due to various reasons. Firstly, the task of fuelwood collection is physically exerting and unsafe. Secondly, it takes away most of their time, subjecting them to time poverty and leaving little or no time for them to undertake productive activities. Thirdly, the use of traditional fuels causes indoor pollution and has adverse health effects. In India, 53 percent of the population lacks access to clean fuels and technologies for cooking, with time spent per day on collecting such fuels ranging from 40 minutes to 2 hours and exposure to smoke from traditional fuels causing 481,738 premature deaths in 2017 (Data World Bank, 2017; IEA 2019). Access to clean energy for women has the ability to reduce

their time and energy poverty. For instance, a study found that the use of an improved cookstove could reduce the time spent on cooking by 20 minutes, which was further reduced by 1 hour 10 minutes with a stove using non-solid fuel. This leaves them with more time for productive activities, and therefore expands women's opportunities for education and paid employment.

The existing literature that explores the gender-energy nexus sees women as victims of energy poverty, recognises the need to reduce their drudgery within the sphere of household, and accordingly considers them as beneficiaries of increased access. However, the emerging literature on gender-energy nexus goes beyond the role of women as "users" and "beneficiaries" of clean energy and emphasises the role that women can play in expanding clean energy. Such literature argues for women being active stakeholders and part of the process of providing clean energy. The underlying basis is that since women are the ultimate consumers of energy, they drive demand for household energy and determine shifts in energy use patterns; therefore making it imperative for the clean energy initiatives to be reflective of their energy requirements.

One of the ways in which this can be done is by integrating women in the energy workforce, particularly in the supply chain of clean energy products and services, as it will cater to women's energy needs better, and bring greater acceptability and adoption of such products. As such, integrating women at all levels of the supply chain including product design, production and manufacturing, distribution and sales, and after sales services is called for. Based on this, the paper investigates the opportunities and barriers for women's integration at all the levels of the clean energy supply chain, and identifies the key determining factors for the same through case studies of ongoing initiatives in India like SURE, Solar Saheli, Barefoot, SEWA and Jagriti for markets for clean cookstoves and rooftop solar systems.

Objectives

The objective of the paper is to understand the evolving nature of the gender-energy nexus in the context of making women a part of the clean energy workforce. The goal is to identify entry points for women in the clean energy supply chain in India, including product designing and corporate segment,

production and manufacture, distribution and sales, and after-sales customer service; and to identify key determining factors that will facilitate such integration. Further, the paper seeks to identify the barriers that hamper the involvement of women at each level of energy supply chain, and examine the impact of gender roles on such integration.

Methodology

The research is developed through a survey of existing data and review of relevant literature and existing initiatives and programmes in the discipline. The research is quantitative and uses statistical tools to analyse data. The observations are inferred from data sets for a 15-year period from 2002-2017. The sectoral scope of the research focusses on the market for clean cookstoves and rooftop solar systems. Research methods include trend analysis, case studies and sector-specific comparative analysis. Quantitative assessment of data on use of traditional fuels, access to clean energy among women and adverse effects of energy poverty among women on their productivity and health has been done and inferences drawn for the gender-energy nexus. Further, a sector-specific quantitative data analysis for women's integration in the clean energy supply chain has been done using trend analysis method and cross tabulation of data on variables including overall women's participation in the clean energy workforce in each sector to be further disintegrated into women's participation at each level of the clean energy value chain. These variables have also been corroborated by undertaking the case study of SURE and Solar Saheli projects in India to establish causality among the key variables and the outcome, and provide a sector-specific comparative assessment. The case study method has further been used to draw on the experiences of projects including SURE, Solar Saheli, SEWA and Jagriti and make inferences on barriers for women's integration in the clean energy supply chain. For the purpose of assessing barriers to women's integration, the key variables assessed are availability of micro finance and institutional credit, role of education in terms of level of education - for instance higher secondary, and type of education - for instance technical and managerial education. All these variables have been identified based on review of literature, availability of datasets and objectives of the research. The main sources will consist of database and reports from international organisations, national governments

and local projects including IRENA, Global Clean Cooking Alliance, UN Women, UNDP, Energia, IRADe.

Results and Discussion

There are differences in patterns in women's integration in clean energy supply chain across sectors: There are variations in women's participation in clean energy supply chain across sectors. In rooftop solar systems, women are most prevalent in office based positions of designing (18 percent) and corporate levels (34 percent), while for clean cookstove, women are primarily engaged in the distribution and customer care services to the exclusion of designing and production segment.

Patterns in women's integration in clean energy supply chain are determined by gender roles and norms in society: Factors determining women's participation in the clean energy supply chain include safety and security concerns, limited mobility outside the household, reluctance to interact with men, and preferences and ease of working with women in the community. The determining factors are the same for both the selected sectors.

Lack of technical education is a key barrier to women's integration at the level of product designing, maintenance and operations, and customer care: For women as product designers and service providers of clean energy products, lack of technical education remains the biggest barriers, affecting their skill development and impeding their integration in the clean energy supply chain.

Lack of access to finance is the main barrier for women's integration as consumers and suppliers in clean energy supply chain: For women as consumers, unaffordability of energy products and difficulty in access to finance limits their purchasing power for clean energy. Lack of access to finance also limits women's participation as energy entrepreneurs since it limits the capital required for purchase of inventory and maintain operations.

Different approaches to provide finance rely on similar women's network and collectives: Jagriti, an NGO in the Himachal Pradesh that promotes energy efficient technologies, ensures customer affordability by negotiating directly

with fuel and cookstove providers to provide the product in bulk. It organises women savings and credit groups (WSCG) where women are expected to pay their group organiser in small monthly instalments over six months. They also support members to make payments by allowing them to access intra-group loans and group collateral. Self-Employed Women's Association (SEWA) Bharat mobilises subsidy from government schemes and facilitates financing from nationalised banks and SEWA Bharat's micro-finance models like the SHGs and credit cooperative to buy products on loan. It also partnered with the IFC to provide accessible loans to its members for procuring clean energy products. Their Grassroots Trading Networks for Women (GTNfW) intermediate with local banks to provide "Hariyali loans" to target families. The IFC have set up a partial credit guarantee scheme to provide capital to the initiative. While the approaches to provide finance are different, they rely on women's networks and organises them in collectives.

Conclusion

Against the background of the role that women can play in expanding clean energy access, the trends in their integration into clean energy supply chains vary across sectors and segments. Despite such variations, the factors that determine such integration show similarity and are based on the gendered norms and roles that exist in society. Further, the barriers to integration are mostly in the form of lack of access to finance and lack of technical education and need to be addressed. In such a scenario, there is a need to integrate women at all levels for better functioning of clean energy markets. For instance, including women at the product designing stage can make the product culturally appropriate and better cater to women's cooking needs. The issue of lack of finance for women has till now been addressed using micro-credit facilities and SHGs. However, there is a need to go beyond those institutions to enhance financial inclusion for women and provide institutional credit. The projects to promote clean energy access should focus on capacity building and skill development of women to enable them to access technical jobs in the clean energy sector, and increase their participation in policy making. Further, there is a need to engender energy projects and policies to provide equal access to resources and enhance women's role in decision making. This will ensure

that women are not left behind and get equal opportunities to participate and benefit from transition to clean energy.

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