

## **Nexus of Gender and Renewable Energy: Importance and Trends in Global and National context**

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### **Abstract**

This is an article on “Nexus of Gender and Renewable Energy: Importance and Trends in Global and National context”. Here, as per objectives of the study, literatures on the respective issues have been reviewed by a desk review process. This paper has highlighted the issues on importance and trends of gender-energy nexus. The reviews have tried to show association between SDG 7: "Ensure access to affordable, reliable, sustainable and modern energy for all." SDG: 5 is "Achieve gender equality and empower all women and girls" for sustainable development. The major highlight of the paper is effective Policy implication, participation, importance and trends, poverty and energy justice and transitions are inseparable entities of gender energy nexus. Energy access saves time, reduces drudgery, reduces indoor air pollution levels, improves education and improves health of women, alleviates poverty etc. Energy access creates new opportunities for income generating activities.

*Keywords:* gender, renewable energy, trends of gender-energy nexus, energy transition

### **Introduction**

As we transition to the 2030 sustainable development agenda, diligent study is required to go beyond comprehending the significance of both gender equality and energy access to examining both as essential to concerns of sustainability, efficiency, as well as efficacy in the energy sector (Gender and Sustainable Energy, UNDP). The term "gender" refers to a system of acquired, non-biologically determined roles, privileges, characteristics, and connections between men and women. Our identities are shaped by gender roles, which also dictate how we are viewed and expected to think and behave as men and women (Khamati & Clancy, 2002). Renewable energy, often known as clean energy, originates from naturally occurring processes or sources that are continuously renewed. For example, sunshine and wind continue to shine and blow, even if their availability varies according to the weather and the time of day (Shinn, 2018).

Human rights, social, environmental, and economic growth are inextricably related to attaining gender equality in the energy sector. The energy business cannot continue to expand the capacity of filthy energy plants to satisfy rising demand. Expanded technical and industrial breakthroughs, expanded electrical

devices, and a worldwide population projected to exceed 9.7 billion individuals by 2050 are the primary factors, with global energy demand expected to be five times greater than current levels (Longe, 2021). It is critical to enhance the quality of life and livelihoods of women and men all around the world by guaranteeing universal access to renewable energy sources, which is also a major global development objective. Energy improves the lives of women and men by producing things and providing and facilitating access to services such as water, health, education, and communication. Gender shapes social expectations, behaviours, obligations, and activities. Gender roles influence both men's and women's responsibilities and connections as energy producers and users, as well as their involvement in the energy labour market and decision-making processes (Prebble and Roja, 2017). Both men and women rely heavily on energy in their daily lives. Gender equality has a direct impact on the energy business. Gender has a significant impact on consumer behaviour, the adoption of novel energy technologies, and public perceptions of various technologies. Academic study on behavioral trends and preferences, as well as investigations into disparities between target customers for energy goods and real consumers, are critical stages in determining these relationships. The impact of energy-related behavior is significant for policymaking and product development. In general, men and women have

different household energy usage trends. As a result, we have a need to encourage the use of ecologically sound, clean, and safe sources of energy in order to fulfil the world's ever-increasing energy demand while also considering gender. The module "Overview of Gender Equality and Energy Issues" developed by the World Bank Group in the context of household energy related to women in developing nations asserts that women are more vulnerable to the negative effects of air pollution when cooking with burning solid fuels in poorly ventilated stoves and kitchens. Other difficulties include women's lack of decision-making authority and access to funding for new cooking technology. Women and men want information about new renewable energy alternatives and how they can be used for improved livelihoods. Based on the foregoing, it is clear that incorporating gender issues into the renewable energy industry is critical for job creation, income production, better safety and health, low carbon emissions to alleviate the effects of climate change, and, ultimately, overall development.

The main objective of this paper is to investigate the nexus between the gender and renewable energy in international and national context. The specific objectives of this paper are to familiarize with issues in gender equality and renewable energy nexus, to reflect the importance of application gender in

renewable energy and sustainable development and to assess the impacts of renewable energy access and transitions in women's life.

### **Methodology**

Desk review is used as the methodology adapted for the study. This work is based on secondary data analysis. Regarding the steps, objectives are defined and the contents of analysis are selected. The content are explored, analyzed and described. Here, some direct quotations are quoted and indirect quotations are paraphrased and finally conclusions are drawn. The contents which were critically reviewed are taken from national and international journals, books, reports etc. via web surfing. As per objective in Gender Equality & Renewable Energy Nexus, macro theories like Structural Functionalism and Conflict theory and micro theory like Symbolic Interactionism and Interaction can be taken as underlying theories but the study can be largely focused on Feminist theory as a theoretical base. The APA 7th manual's format is followed for the citation.

### **Result and Discussion**

#### **1.1. Global context**

Using the most recent data from Tracking SDG7: The Energy Progress Report 2021, SEforALL has provided an in-depth analysis of the world's current situation across the four SDG7 targets: accessibility to electricity (7.1.1), clean

cooking access (7.1.2), renewable energy (7.2), and energy efficiency (7.3).

According to the paper *Understanding Gender* (2021), men and women, boys and girls suffer poverty differently and confront distinct challenges in accessing services. It has suggested that economic resources and political opportunities aid in targeting initiatives. Understanding gender relations and the power dynamics that underpin them is essential for understanding individuals' access to and distribution of resources, decision-making capacity, and how political processes and societal development affect women and men, boys and girls alike.

According to Hostettler and Hazboun (2015) in their book "Sustainable Access to Energy in the Global South," energy requirements on a global scale are large and steadily growing, but the need to reduce carbon emissions is critical if catastrophic climate change is to be avoided. In global south, a major section of the population continues to lack access to energy, which is essential for poverty reduction through job creation and improved systems for education and health. Sustainable energy is widely seen as a promising way to link economic progress to enhanced social equity while protecting the environment. Simultaneously, energy efficiency and the percentage of renewable energy in the global energy mix must continue to grow. While hopeful technological interventions are provided, this publication also focuses

on the limitations of technology and the unrealized potential of incorporating women as essential partners in energy efforts. To provide everyone with sustainable, dependable, and cheap energy, sectors, stakeholders, policies, infrastructures, and technologies must work together hand in hand. Promoting renewables, enhancing energy efficiency, tackling the constraints of customising solutions to specific socioeconomic circumstances, fostering local ownership, and striving for enormous upscaling remain critical topics.

Imbulana and Managi (2021) used the ideas of holistic linkages and cause-effect reasoning to discover the gender component in their investigation of the relationship between self-reported knowledge and concerns about energy sustainability. By investigating people's awareness of energy sustainability and concerns regarding its significance, authors have added to the body of current material. This research illustrates individual differences using data from a large-scale poll of 100,956 respondents in 37 nations. Women are more concerned about the significance of energy sustainability than men are, and men. These findings are in line with the research showing that women are more adept in holistic connections while men are more adept at cause-and-effect reasoning. It would be advantageous to include both ways of thinking when making decisions on energy saving and sustainability. In an effort to

reduce carbon dioxide emissions and advance energy sustainability, there is a growing interest in researching sustainable energy.

Six worldwide trends are highlighted in the article by Pearl-Martinez (2020), which is directed at policymakers. These themes are: decentralisation of energy services; affordability; mobile payments; women entrepreneurship; urbanisation; and humanitarian contexts. It will be necessary to pay attention to the manner in which these trends support or impede gender equality in energy access if we are to achieve energy access for all, as required by SDG 7. The goal was to investigate and raise awareness among decision-makers of the international trends play in attaining gender parity in energy access. There is ample evidence that energy access promotes economic growth, reduces poverty, and has other positive socioeconomic effects; however, little is known about how current trends are affecting gendered energy access. Enhanced comprehension of the gender dimensions of these patterns may aid decision-makers in formulating policies and allocating funds to augment the accomplishment of the 2030 goals.

The abilities acquired in assessing non-recourse cash flow-based financing have been emphasised by Raikar and Adamson (2019) as having broad applicability in project finance and investment in infrastructure, in addition to the field of green energy. Through a combination of fundamental research and



real-world examples, readers will discover how renewable energy project financing functions in realistic agreements that blend financial, public policy, legal, engineering, and environmental challenges. They said that Theory and Practice in the Context of Renewable Energy financing connects the unique qualities of renewable energy with essential components of project financing. Research on "nuclear" homes has revealed that women still perform the majority of the cooking, cleaning, and washing, with household work being sharply segregated based on conventional gender roles. This indicates that women carry out the domestic chores that account for the biggest share of energy consumption and utilise the most energy-intensive appliances. Rather, men handle house upkeep, and the energy consumption in the home that they are accountable for comes from using the computer or TV (Mort, 2019).

Renewable energy is critical to lowering greenhouse gas emissions and combating climate change, as well as improving countries' energy security and giving social benefits to their communities. The region of Latin America and the Caribbean constitute one of the most active regions in this industry, with energy sources that do not emit CO<sub>2</sub> accounting for more than half of its demand. In areas where a new renewable energy plant is being built, neighbouring communities can profit from the project's economic potential during the building and maintenance stages, as well as money from land

leasing. Women, in particular, can gain access to new occupations and income-generating possibilities, as well as enhanced health and safety as a result of increased quality in community social services such as hospitals and educational institutions, among other things. However, renewable energy initiatives have the potential to worsen gaps among recipient communities and create or intensify gender inequities. Women, for example, participate in far fewer pre-project consultations and have fewer opportunities to employment than males. As a result, women are rarely included in choices on the advantages that the firm provides to the community as part of the project. To avoid creating these inequalities, gender considerations should be included in the design and implementation of renewable energy projects, allowing female voices to be heard and meeting their most immediate requirements, transforming women into active change agents in their neighborhoods (Gender and Renewable Energy: Wind, Solar, Geothermal, and Hydroelectric Energy, 2014).

Without taking into account gender behaviours and cultural conventions around gender, the energy cannot be properly comprehended. We define gender as socially determined roles and distinctions between men and women. Repetitive and negotiated processes form the basis of these jobs. This research examines gender from the viewpoint of women who make decisions in the

energy sector. While concentrating only on gender provides a narrow perspective on the dynamics of both inclusion and exclusion in renewable energy projects, we believe that including gender into the analysis will reveal potential solutions to problems and hasten the transition to renewable energy (Lazoroska, 2022).

The effects of the rural Indian women's prolonged reliance on traditional fuel are multifaceted. According to the study, they must spend between five and eight hours a day on tasks linked to cooking, with the acquisition of fuel wood accounting for twenty percent of this total time. Their susceptibility to anemia and respiratory diseases is increased by their poor nutrition, which is further compounded by their workload, which includes lugging 40 kg of heavy wood, walking a minimum of 2.5 km on foot at least twice a week, cooking in dimly lit spaces, and making use of inefficient biomass stoves that pollute indoor air (Pavithra, 2021).

## **1.2. National context**

A research on "Gender, time-use, and energy expenditures in rural communities in India and Nepal" was conducted by Picchioni et al. in 2021. They made use of statistics from four rural communities in Nepal and India from agricultural households. The results demonstrated that patterns of time utilisation and energy expenditure varied significantly by gender. Men and

women engage in productive work at similar rates, but in rural homes, women bear the majority of the added reproductive labour demands, which takes time away from leisure activities. Women's time-use habits have a significant role in determining their nutrition and general wellbeing because they serve as a substitute for the demands of reproductive and productive activities. They did, however, draw attention to the shortage of empirical data about how time-use patterns relate to patterns of energy expenditure and physical activity, especially in rural areas wherein seasonal agricultural employment plays such a significant role.

After examining the gender component of national energy programmes and policies in Nepal, the Asian Development Bank (2015) made the following suggestions to ensure that women may meaningfully engage in and take advantage of energy sector interventions:

- Integrate gender into energy sector policy.
- Include gender considerations in all facets of energy initiatives.
- Ensure women's participation in energy planning, initiatives, and decision-making.
- Involve women in the technical elements of energy projects, and advocate for their involvement in energy infrastructure management.

- Strengthen women's ability to use energy for improving their lives and revenue generating.

Kuriakos and Nelson discuss the following gender and energy objectives in their paper "The Art of Implementation: Gender Strategies Transforming National and Regional Climate Change Decision Making" (IUCN, n.d.).

They are:

- Create energy policies that are gender-sensitive in Nepal.
- Increase understanding of the significance of energy, climate change, and gender, and put in place efficient systems for stakeholder cooperation.
- To make energy programmes more effective, increase the number of women who actively participate in them.
- Encourage women's organizations to take the lead in promoting mitigation and adaptation measures for climate change.
- Expand the number of commercially feasible, diverse energy technology alternatives available.
- Decrease rely on biomass energy
- Invest more on energy solutions that are gender-sensitive.
- Implement an effective energy plan for metropolitan contexts.

- Create and implement a community adaptation/mitigation strategy to address climate change and reduce emissions at scale, leveraging the role of women at the home level.

Clean and sustainable energy sources, including biogas, better cooking stoves, and solar household systems, are widely recognised technology in Nepal.

However, due to limited purchasing power and insufficient institutional support mechanisms, these remain short- to medium-term solutions. Economic hardship and a lack of technical understanding are common among individuals living in rural regions, and this continues to be a major barrier to the country's greater usage of renewable energy technologies (Raikar & Adamson, 2019).

Nepal's primary sources of energy include biomass fuels, oil products, coal, and hydropower. The majority of Nepal's population lives in rural regions with limited access to energy infrastructure and a consumption pattern dominated by traditional biomass fuels. Indoor air pollution does exist. Hydropower has the greatest growth potential, although less than 2% of total commercially exploitable generating capacity has been utilized. Commercial usage of electricity is uncommon since energy supplies are insufficient even for domestic consumption. Gender equality and social inclusion (GESI) factors for sector planning and results, as well as restricted access to money, appliances, information, training, and education, limit women's and excluded groups'

access to energy resources. Men and those with advantages typically make decisions on energy items and services, which are influenced by social norms. Lack of access to contemporary energy sources increases women's labor stress and susceptibility to sickness, particularly among low-income individuals. Challenges prevent women and marginalized groups from making good use of energy. There is a little incorporation of GESI features into all aspects of energy strategy and policy. To address GESI challenges, the sector's institutional capability must be reinforced. Energy Good Practices and Lessons Specific ways to increasing access for local people, particularly women and marginalized groups, are required. Technologies that aid women and marginalised populations can provide various advantages. It is critical to engender utilities since women and marginalised groups confront structural impediments to involvement in the electricity industry, including underrepresentation in employment, particularly in technical, higher-paying jobs and leadership responsibilities (ADB, 2020).

Pokharel (2021) conducted a study in Nepal that examines the relationship between indoor air pollution and the disproportionate effects it has on women in the Koshi basin; the gendered impacts of this specific dimension of energy poverty are perpetuated by women's fixed roles and limited autonomy in households; and the necessity of gender-sensitive energy programmes and

policies. Every year, some 8,700 individuals in Nepal, mostly women and children, pass away too soon from diseases brought on by indoor air pollution from burning solid biomass fuels. It focuses on how one particular aspect of energy services—home access to clean cooking facilities, or fuels and stoves that don't pollute indoor air—affects women differently than males. The predominant source of energy for over two-thirds of people in Nepal is solid fuel, such as firewood (64%), which is a significant cause of indoor air pollution. Women are particularly impacted by indoor air pollution because they manage and use energy sources for cooking in the home in a considerable way.

According to Cecelski (2000), the development of renewable energy can meet the needs of women in the following areas: livelihoods and income in the energy sector for microenterprises; fuel substitution; health and safety in the biomass cooking crisis; women's invisible time and effort in the human energy crisis; and energy efficiency and transport in the modern sector.

In their research, Shrestha (2020) looked at how gender differed in the decision-making process for buying electrical appliances depending on the socioeconomic background—headship, family structure, ethnicity, and location as independent variables, and energy practice, knowledge, and consciousness as dependent variables. Subsequent research reveals that during



the past three decades, residents of Kathmandu have used more electrical appliances. Appliance usage and acquisition have a major role in household energy-saving practices. The results showed that while males had little greater energy understanding in technology, women actively engaged in energy-saving techniques. By examining energy bills, women scored far higher than men on the attitude test for environmental concern. The involvement of women in energy decision-making has a favourable impact on household energy saving, notwithstanding their lack of technical understanding. The goal of the project is to use empirical understanding of gender inequalities to inform energy policy and facilitate sustainable decision-making.

### **Conclusion**

Gender and energy nexus speed up the progress and prosperity. The reviews have tried to show association between SDG 7: "Ensure access to affordable, reliable, sustainable and modern energy for all." SDG: 5 is "Achieve gender equality and empower all women and girls" for sustainable development. Effective Policy implication, participation, importance and trends, poverty and energy justice and transitions are inseparable entities of gender energy nexus. Energy access saves time, reduces drudgery, reduces indoor air pollution levels, improves education and improves health of women, alleviate poverty etc. Energy access creates new opportunities for income generating activities.

Women's better access to clean and renewable energy could also reduce the burden of unpaid domestic work, create employment opportunities, improves health condition, be in decision making position etc. finally women will be capable enough to be in public sphere from private sphere being involved in productive task, having access to opportunities and capital, remunerated, with self-determination and will be included socially. Women's location within private sector lead not only to their exclusion from public life but also denied right to equality for women in family.

In addition to helping women advocate for their strategic requirements in the home and community, modern energy services also enhance the health and quality of life of women, enabling them to take a more active role in development. this has a significant impact on the overall empowerment of women. For the energy industry to flourish holistically, gender issues must thus be taken extremely seriously. In order to maintain environmental sustainability and promote economic growth, women must participate fully and equally in the energy industry. Gender issues must be taken into account in the renewable energy industry in order to create jobs, generate revenue, enhance health and safety, reduce carbon emissions to lessen the effects of climate change, and ultimately advance general development.

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