

Solar Energy Entrepreneurship for Socio-Economic Empowerment of Indian Rural Women

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ARTICLE DETAILS

Article History

Published Online: 09 March 2019

Keywords

Solar energy, sustainability, entrepreneurship, women

ABSTRACT

India faces a huge energy crisis due to its rapid urbanisation, growth of industrialisation and burgeoning population. Meeting the current and future energy demand is a herculean task for a developing country like India where majority of the energy resources depend on fossil fuels which are very scarce, in fact India possess only 1% of energy reserves of the world to cater to its 16% population of the world. This gap is wide in urban and rural as rural India lacks grid connectivity. Solar energy provides a sustainable solution to meet the rural energy needs. Rural women are empowered both socially and economically with the solar entrepreneurship thus achieving sustainable development. The current research paper focuses to study the impact of solar energy entrepreneurship on socio-economic lives on Indian rural women. The paper is based on the secondary sources of data.

1. Introduction

India being one of the developing countries, there are three hundred million people do not have access to electricity. Currently, India is growing above eight percent, the second fastest growing economy in the world (MNRE). According to a report by BP oil company, by 2035 demand for energy in India will grow by 121%. It is imperative for india to look for alternative sources of energy. Meeting the energy needs of the country in sustainable manner is the major challenge of the country. Renewable energy has the potential to reduce global warming, address environmental issues, mitigate poverty, and increase energy security. Among the renewable energy sources, available solar energy is the promising source of energy to meet the global energy needs in reliable and sustainable fashion. There is a significant difference between rural and urban India in terms of energy access and quality due to many constraints. In fact, solar energy is the future source of energy of the world will create massive employment opportunities and huge entrepreneurial prospects to the rural India, which would enhance the standard of living in rural areas. Solar entrepreneurship will increase regional development and contributes to the upliftment of the rural folk.

2. Objective of the paper

The current research aimed to study the impact of solar energy entrepreneurship on socio-economic growth of rural women in India.

3. Research methodology

The study is based on the literature available in the field and sources include research journals, reports and internet sources.

4. Solar energy for sustainable rural India

Sustainability is the critical factor affects the human activity and development. According to Montes, G M. *et. al.*, (2005 sustainable energy production and consumption can have positive implications based on (i) the pervasive energy

usage, (ii) in the socio and economic development and living standards and (iii) the overall impact the energy processes and systems have had and will continue to have on the environment. Sustainable development benefits in the area of health, education, employment opportunities and reduced import of energy sources from foreign countries (IPCC, Intergovernmental panel on climate change, UNEP report, 2012). With the increased climatic pollution, numerous countries across the world adopting sustainable path (Rosen MA., 2009). Investments through women entrepreneurship could significantly contribute the living standards of the remote and declining regions of the country.

More than one third of India's population live with no grid connectivity for electricity access and almost the same number of people with unreliable grid access for energy supply and suffer from frequent energy cuts (report from Planning commission of India). Solar energy will improve the employment prospects and improve energy efficiency in rural India. India, being the first country in the world to have established an exclusive ministry the Ministry of New and Renewable Energy (MNRE) in 1992 to cater to the energy requirements of the country in a sustainable manner. Under the same ministry, the government of India established Jawaharlal Nehru National Solar Mission (JNNSM) in 2010 to meet the energy deficit in the country with solar energy.

As the Indian economy moving with a positive momentum, Rural India accounts for approximately 67% of the total population contributes 37% to the GDP of the country. Agriculture being the backbone of rural livelihoods adds to the socio-economic upliftment. Rural India lags behind in spite the growth of the economy is beyond 7 percent, competing with the developed nations. The lack of fundamental infrastructure such as energy, clean water are the major barriers for the growth of rural India. Solar power has immense potential to bridge the energy demand and supply. Under the initiative,

“Electricity for all by 2019” the government is providing incentivised solar energy in rural India.

5. Women Entrepreneurship

An entrepreneur is a person who initiates a new enterprise, who shapes the economy of a country by creating new employment opportunities and wealth (Mahajan, S., 2013). Wang, (2011) stated that they add great value to the socio economic growth, create synergies in communities focus on long run in order to generate value at both national as well as local level. Entrepreneurs focusing the rural development bring out the local entrepreneurial talent and contribute to the subsequent growth of indigenous firms (FAO, 1994), which creates employment opportunities and add economic value to a specific community or region with the scarce resources available. Entrepreneurship in rural areas supports the upliftment of the poor people (Davis, 2006). The concept of entrepreneurship has been a great concern for researchers, academicians, corporates and policy makers. There is a significant high correlation of entrepreneurship with economic advancement of any country (Schramm, 2006; Baumol *et al.*, 2007).

‘You can tell the condition of a nation by looking at the status of its women.’ The statement by Jawaharlal Nehru shows the importance of women empowerment. Women empowerment has been a critical issue of discussion in the recent past (Fazalbhoy, S., 2014). Women empowerment can be achieved by providing equal entrepreneurial opportunities to women across different sectors.

According to Suganthi (2009), women entrepreneurs are the women or a group of women who embark, organize and operation a business firm. Women become economically independent by accepting challenging roles to meet their personal as well as societal needs (Goyal, M., & Parkash, J., 2011). In the past few decades the women entrepreneurs are growing rapidly in developed as well as developing economics. They contribute enormously to improve literacy, poverty levels and create employment opportunities (Aguirre, D., *et al.*, 2012; Kumar, S. M. *et al.*, 2013; Ogidi, A. E., 2014).

5.1 Empowering rural women through solar entrepreneurship

Solar energy has the potential to bring a change in millions or rural poor women across the globe. Opportunities in solar energy entrepreneurship include unskilled, semi-skilled and skilled jobs such as business development, construction, production of solar energy gadgets, operations, service and maintenance (World Resources Institute).

Solar energy provides entrepreneurial opportunities to the rural women. For instance, Barefoot College was founded in Rajasthan, India in 1972 to bring about a change in the lives of rural women through solar entrepreneurship. The organisation trains women from rural areas to become solar engineers, educators to provide sustainable solutions to tackle poverty and economic solutions.

Fig: Solar energy entrepreneurs at Barefoot College, Rajasthan



Sakhi Unique Rural Enterprise (SURE) is a distribution and marketing firm of solar energy products functioning with rural women entrepreneurs to market clean and sustainable

energy products such as solar cook stove, solar lantern and solar water heaters. The purpose of SURE is to protect the health and wellbeing rural households in India. SURE trains

rural women entrepreneurs with door to door selling techniques to increase their income.

Swayam Shikshan Prayog (SSP), an NGO was established in Pune, Maharashtra to help the Indian rural women to become solar energy entrepreneurs. There are about 1,010 solar women entrepreneurs in the villages of Maharashtra and Bihar who have empowered themselves financially by selling solar energy appliance to the rural households. Currently, India employs approximately 103,000 people in solar energy sector (International Renewable Energy Agency).

6. Socio economic benefits of solar energy

6.1 Social dimension of solar entrepreneurship

6.1.a Education

Education is one of the foremost requisites for the growth of any country. Lack of electricity in the rural remote areas of our country hindering the progress drastically. As per the census 2011, approximately one third of our country's population lacks basic electricity facilities, which has to be tackled diligently. Children in rural areas use kerosene lamps for education which causes severe health issues. Children who study under the kerosene lamps post sunset due to frequent power cuts succumb to health problems.

Solar energy is a boon to these vulnerable students facing difficulty to pursue their education. Innovative solar rechargeable lamps and LED study lamps are safer, cleaner and brighter to use. Many of the private and public run educational institutions are utilizing solar energy sources. Sri Aurobindo International Centre for Education from Puducherry is the first solar-run educational institute in our country. The institution generates three times the capacity it requires for the daily operations, apart from it, the institution generates an

additional revenue of Rs. 10,000 per month. Within a span of ten months the institution will make the break even.

6.1.b Health care

About 55 per cent of households in our country depend on public health systems to meet their healthcare requirements. But according to the government data as on 2015 approximately 35 million people in villages depend on local health care centres which lack the basic electricity supply and abrupt power cuts hinders the quality healthcare services. A report by council on Energy, Environment and Water, an NGO reveals that only a fifth of these primary healthcare centres meet the Indian public health standards.

A research study on Primary Health Centres (PHCs) in Chhattisgarh concluded that the PHCs equipped with solar energy systems substantially enhanced the in-patient services, out-patient services, emergency services, laboratory services in the hinterland of the country. Solar powered PHCs meet the energy requirements of both National Solar Mission (NSM) as well as National Health Mission (NHM). Many states of the country heading towards the installation of solar power systems in PHCs as they are reliable to store vaccines, operative devices, sterilise equipment and other emergency medicines. A study was conducted with a sample of 147 PHCs in Chhattisgarh revealed that the 83 solar powered PHCs have drastically improved the health care standards in the state. Based on the insights from this study, the Chhattisgarh State Renewable Energy Development Agency (CREDA) had installed solar power systems in 570 PHCs of the state during the period 2012-16. The results gave valuable inputs and they could be significant as majority of the population in our country reside in villages.

Fig 3. Fully solarised PHC in Chhattisgarh



Basic health care services have been critical in the far flung areas of the country where there is no access to reach especially the north-eastern states of the country. Solar equipped boat clinics offer healthcare services on the Brahmaputra river in Assam state of India. The first 15 boat clinics in India have brought a substantial change in the health

conditions of the people in the remote areas. Karuna Trust an NGO working with SELCO to equip PHCs with solar power in Karnataka, Arunachal Pradesh and Meghalaya. These systems are designed to meet the current and future health care requirements.

6.1.c Solar cookers

A report from World Health Organisation revealed that approximately four lakh Indians die prematurely annually due to the ill effects of biogas and biomass fuel for household cooking usage. The emission of smoke and other hazardous gases from the burning of biogas and biomass fuel in poorly ventilated village homes is one of the major causes of respiratory diseases among women and children. According to WHO report, 4.3 million deaths are caused worldwide deaths caused due to indoor air pollution in the year 2012 out of 7 million deaths occurred due to air pollution. Rural folk spend hours of time in order to gather wood or biomass for their cooking needs and waste valuable time and energy. Barefoot college created a society for solar energy engineers who design and produce solar cookers.

India post, collaborating with Western Union Money Transfer distributing solar equipped cookers in 16 villages in Agra region. Government of India provides subsidy up to 50% subsidy to empower women as the poor village households cannot afford the high cost of solar cookers.

6.1.d Drinking water

There are two billion people across the world do not have access clean drinking water. 1.8 people are using untreated drinking water. There are about 77 million people in remote of the India do not have access to safe, clean drinking water facility more than any other country in the world. The need for safe and fresh drinking water is increasing rapidly (Kale, D. N, 2017). Providing clean drinking water is one of the major challenges the government facing as water treatment requires the use of power. Solar energy plays a critical role in water treatment. An advanced solar enabled water treatment system is installed in Tseiesma, Nagaland a village nearby Kohima to provide safer drinking water. India's first solar power equipped reverse osmosis water plant purifies over 3,600 litres of safe and clean drinking water caters to 1000 villages in Rajasthan.

6.1.e Solar lighting enhances productivity

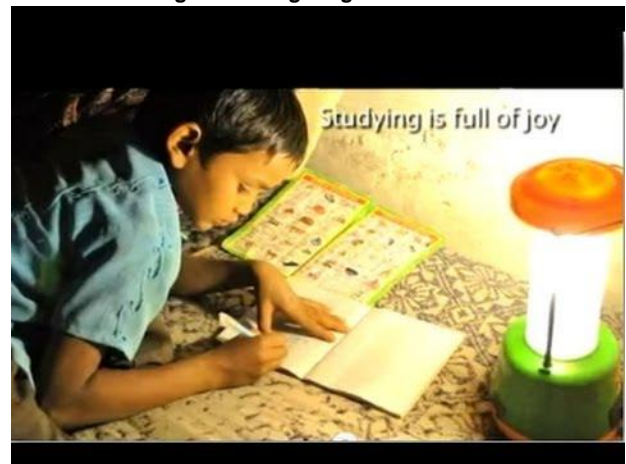
Reports from the Planning Commission of India reveal that more than one third of India's population do not have access to grid connectivity and rely on kerosene lanterns and lamps for basic home lighting which causes serious health problems to women for children in particular.

Kerosene lamps emit poisonous carbon monoxide which is harmful for health and depletes the ozone layer. Breathing emissions from kerosene lamps is equal to smoking of two packs of cigarettes a day. The lack of proper lighting from the kerosene may lead to loss enthusiasm and interest among the tiny minds on education. The light emitted by the kerosene lantern is not spread evenly causes a serious eye sight. An average Indian household spends approximately Rs. 900 per a month which is subsidized by the Government of India and use of kerosene lamps may cause major fire accidents.

Solar home lighting not only provides high quality solutions to enhance productivity in hinterlands but brings a substantial change in rural life by reducing health hazards with a replacement of kerosene lamps. Almost 30 per cent of rural productivity is improved an additional lighting system for 4-5 hours and brings a change in rural life style.

Lighting Asia/India program focussed to bring high quality solar home lighting systems to nearly three million people who do not have electric grid connectivity. By the end of 2015 it had reached approximately eight million people across India.

Fig 4. Solar lighting for educatin



6.2 Economic dimension

6.2.a Agricultural water pumps

As it is a well known that agriculture has been the backbone of Indian economy and provides the food requirements of the country. India accounts the largest agricultural land in the world. Agri production and electricity are highly correlated. Solar powered agricultural pumps will improve the agricultural yield drastically. Solar equipped agricultural pumps are the best alternative to meet the requirements in an economic and environmental friendly manner. Majority of the agriculture in the country is based on rain or conventional water pumps that run by electricity or diesel. Due to frequent and abrupt power, cuts give limited yield, reducing the farmers' income levels and hampers their livelihood in rural India. The Government of India is promoting solar energy based water pumps under the National Solar Mission program to address these challenges. As the up-front cost is high, the central and the state governments provide subsidy to the farmers. Solar water pumps provide reliable and consistent power supply to improve the farmers' standard of living. With the subsidy on solar water pumps, expenses on diesel-run water pumps comes down, moreover solar water pumps reduces the enviromntal pollution.

Fig 4. Solar water pump for irrigation

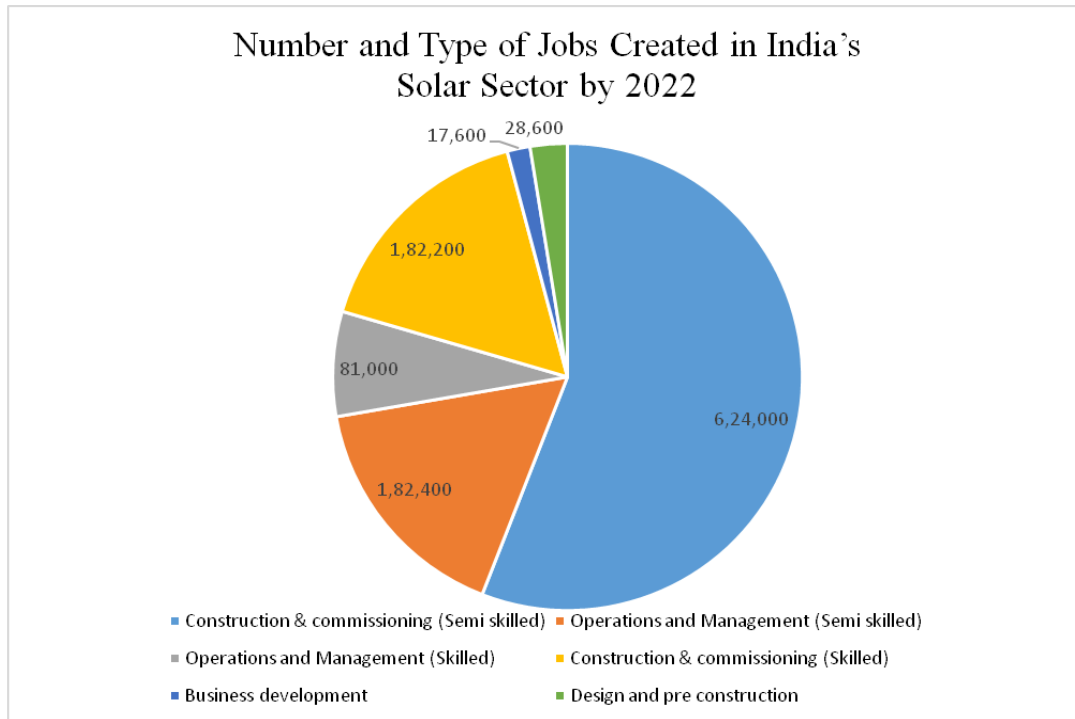


6.2.b Creation of Job opportunities

Employment opportunities in the renewable energy sectors contributes significantly to the preservation and

conservation to the natural economy. Both developed and developing economies taking initiatives towards achieving pollution free environment. Renewable energy production plays an important role in regional development and improves the income bracket of rural areas. Solar energy in particular enhances employment opportunities in rural areas. These job opportunities provide steady and reliable income source,

health benefits to the rural people improves the skill building prospects to the semi-skilled and unskilled rural folk. According to the report from Natural Resources Defence Council (NRDC), approximately ten lakhs jobs would be created in solar energy sector if India achieves the target of 100 Giga Watt solar power connected to grid by 2022. This initiative strengthens the local economies across the country.



Source: Natural Resources Defence Council report, 2016

Fig 5. Solar energy for employment



7. Conclusion

Energy poverty is gendered as women disproportionately bear the ill effects of kerosene lamps, as thousands of villages in the country do not have access to electric grid. Solar energy women entrepreneurs bring a drastic change in the socio-economic status of rural people. Solar energy brings revolutionary changes in the field of health, education, farming

and employment opportunities. It empowers the women with entrepreneurial opportunities and enhances the livelihood of rural people. Solar energy adds value to the local and regional economic growth. Solar energy is the promising source of energy and will flourish in future if government supports the entrepreneurs and market barriers are removed.

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