



# REVIEW OF RESEARCH

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## “RURAL ELECTRIFICATION USING SOLAR ENERGY”

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### ABSTRACT:

Rural electrification using solar energy is an effective solution to provide electricity to rural communities that are not connected to the national grid. Solar energy is a clean, reliable, and cost-effective source of energy that can be used to power homes, schools, clinics, and businesses in remote areas. The design of solar energy systems can meet the specific needs of a community, and the cost of solar energy has been decreasing, making it an affordable option for rural electrification. Solar energy systems are relatively easy to install, require little maintenance, and can power other critical services, such as water pumps and communication networks. By reducing dependence on fossil fuels, rural electrification using solar energy can also contribute to climate change mitigation. With the right investments in infrastructure and technical expertise, rural electrification using solar energy can bring clean, reliable, and affordable energy to remote communities, improving the lives of millions of people around the world.



**KEYWORDS:** Rural electrification, water pumps and communication networks.

### INTRODUCTION:

Electricity is a basic human need and it is key in accelerating economic growth generating employment, and enhancing human development. Lighting is correlated to the productive hours of any household, that is, the hours of the hours of children study and adult work. The Availability of electricity works to the advantage of women in particular, as with the electricity availability and proper lighting at any particular area helped in the female literacy and education, their income generating option and savings and their safety and security in public places as per a global study. Rural electrification greatly contributes to the welfare growth of household and promotes rural-urban integration. There is a need of electricity in rural area as much as in urban areas as the both rural and urban area in the road of rapid development.

Almost 70% of the Indian population lives in villages. In recent times, more cases of farmers' suicides due to crop failure have been reported. Even after 70 years of independence, we lack a 'support and guidance system'; nor do we have professional counseling for farmers. Many of them have no secondary source of income this is a major lacuna. The lack of job opportunities in villages coupled with less remunerative farming compels village youth to migrate to cities. There, many of them do not enjoy a reasonable quality of life because they manage to get only subsistence jobs, also facing issues with

relation to availability of Electricity at village level worsen the situation. In order to address these challenges the area relating to rural electrification using solar energy is an important area to be developed thus to provide better source of income to farmers and the better standards of living.

India is blessed with the huge amount of solar Energy. It observes around 300 sunny days a year on an average highlighting a huge potential of solar energy in India. Solar energy could play an important role in alleviating poverty. Solar energy in India is poised to take off in an exponential manner because of unique confluence of demand and supply factors. As the cost of solar energy is declining since past two years and is near to achieve its grid parity. Strong support from government through its National Solar Mission has provided huge support to the industry.

### DISCUSSION:

Rural electrification using solar energy is an important and promising solution to the problem of energy poverty in rural areas. It has the potential to bring electricity to millions of people who live in remote areas and are not connected to the national grid, improving their living conditions and overall quality of life. One of the major advantages of using solar energy for rural electrification is that it is a clean and renewable source of energy. This means that it does not produce harmful emissions and pollutants that contribute to climate change and health problems, unlike traditional fossil fuel-based electricity generation. Furthermore, solar energy is abundant in most rural areas, and once the initial investment is made, the fuel cost is essentially zero, which can make it more affordable for rural communities. Another key benefit of using solar energy for rural electrification is that it can be tailored to meet the specific needs of a community. The design of solar energy systems can range from small off-grid systems that power a single household to larger systems that can power entire villages or even small towns. Solar energy systems can also be used to power other critical services, such as water pumps and communication networks, which are essential to the health and well-being of rural communities.

The cost of solar energy has been decreasing steadily over the past few years, making it more affordable and accessible for rural electrification projects. However, there are still challenges and barriers that need to be overcome, such as the high upfront cost of solar panels and batteries, the lack of skilled labor to install and maintain the systems, and the need for supportive policies and regulations to encourage the development of renewable energy in rural areas.

**Rural Electrification:** The National solar Mission was framed to promote the use of solar energy for power generation and other applications also promoting the integration of other renewable energy technologies like biomass and wind with solar energy options. Various tax exemptions, capital subsidies, and incentives are available for several components and sub-components of solar energy value chain. JNNSM promotes the assembly of solar modules after import of cells which is free from import taxes. Other benefits are also available with regard to the manufacturing of solar energy products like lanterns, street lights, pumps thus to support and boost the solar energy products manufacturing.

**Necessity of Rural Electrification:** As per the report of World Bank, urbanization in India is increasing at a rapid pace and by 2036, 600 million or 40 % of population of India will be living in cities, in order to mitigate that cause it is very crucial time to develop rural areas and creating more job opportunities in these areas. The development is not possible without the availability of electricity and solar energy (grid connected) is catering the need of the electricity for the remote areas as well and as the coal is not available at every length and breadth of the country also it is expensive to import, also it is polluting source of conventional energy thus solar is one best substitute to this problem.

The rural communities are still waiting to see the availability of electricity. People are deprived of carrying on many activities after the sun set. Children are deprived of studies during night, no economic activity can be performed, also other problems associated with it.

An innovative solution, rural photovoltaic micro grid can solve the energy deficiency in the rural areas of the country. Each household will be equipped with the smart meter that will interact with the central control system. Micro grids have huge potential in rural areas as setting up the panels in these areas are less expensive and can easily cater to the needs of the rural India by bringing the generation source closure to end users. As technology progresses, solar system are also getting more efficient and cheaper, eradicating the fewer drawbacks that have prevented widespread acceptance of solar energy.

**Following broad consensus concerning the impact of Electrification in the rural areas:**

Quantifiable benefits: Cost saving and increased productivity Industrial and commercial uses of electricity Household uses of electricity, Lighting, cooking etc. Agricultural uses of electricity: Water pumping, Benefits those are difficult to quantify Modernization, dynamism and attitude changes, Quality of life, community services and participation. Income distribution and social equity Employment creations.

**Challenges to Rural Electrification :** The grid extension based rural electrification promoted through RGGVY and other programmes suffered major hurdles which include, High cost of grid extension and low recovery due to highly subsidised tariff, low level of tariff collection resulting in negative return. Supply rationing due to non-availability of power. High operation and maintenance costs.

**Initiatives by the Gol:**

1. Rural electrification under Minimum Needs Programme launched in 1974.
2. Kutir Jyoti Yojana to provide single point light to below poverty level (BPL) families in rural India launched in 1988.
3. Pradhan Mantri Gramodaya Yojana to electrify un-electrified villages as per prevailing definition of electrification launched in 2003.
4. Remote Village Electrification Programme launched in 2001 by Ministry of New and Renewable Energy (MNRE). This programme focused on electrifying remote villages not connected to grid through use of renewable energy sources.
5. Accelerated Rural Electrification Programme in 2003.
6. Accelerated electrification of one lakh villages and one crore households launched in 2004.
7. Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY): Launched in 2005, this programme aimed at providing energy access to all by 2009 and at least one unit of electricity per household per day by 2012 as envisaged in NEP (National Electricity policy) 2005. All earlier programmes were merged in RGGVY.
8. In 2009, MoP launched Decentralised Distributed Generation Scheme under RGGVY to electrify un-electrified villages through mini grids. This also included villages which receive less than six hours of electricity per day.
9. In December 2014, current government announced Deendayal Upadhyay Gram Jyoti Yojana (DDUGJY) with major modifications in RGGVY.

**CONCLUSION :**

In conclusion, rural electrification using solar energy is a promising solution to the problem of energy poverty in rural areas. It has the potential to bring clean, reliable, and affordable energy to remote communities, improving the lives of millions of people around the world. However, achieving this goal will require a concerted effort by governments, non-profit organizations, and the private sector to invest in infrastructure, technical expertise, and supportive policies and regulations.

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