



# ENERGY ACCESS THROUGH OFF-GRID MICRO HYDRO PROJECTS

Access to infrastructure is one of the basic requirements for development of an economy, and it holds its importance especially in the context of off-grid rural areas that generally lag behind in most of the developing countries. Energy is the most important of these infrastructural requirements and uninterrupted supply of energy is essential for development. In this article, **Onkar Nath** talks about how electricity supply from micro-hydro power projects has shaped economic development in remote regions of Uttarakhand.

**T**here are different elements that constitute infrastructure, such as road, water, sanitation, electricity, health, telecommunication, etc. Each one contributes and complements other elements in achieving overall development of a region or a country. Access to electricity is perceived to be a key requirement for poverty reduction by enabling the creation and improvement of income-generating activities.

India being a fast developing country is actively pursuing rural electrification since decades. However, major push for electricity for all came in 2003 with the passing of Electricity Act 2003. The significance of access to electricity were mainly for two purposes, that is, (i) Household consumption and (ii) Commercial consumption. Although government has extended its support in laying down grid infrastructure to the villages and also supported BPL families by providing free of cost connection, there was limited focus on active promotion of electricity for commercial uses. Although Rural Electrification Policy acknowledges the role of electricity in productive activity and livelihood generation in rural areas, it requires special efforts for promoting economic activities through electricity provision. There are few studies that attempted to establish a direct relationship between access to electricity and productive uses of energy leading to economic development. The relationship between access to electricity and productive uses of energy is inconclusive and need more comprehensive research. Most of the studies are country specific, adopt different methodologies, control group, and time frame. In the context of India, we have one positive example where providing electricity for irrigation pumps by heavily subsidizing electricity rate has resulted in an increase in agriculture productivity but this is grid connected and not an off-grid example.

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In context of Uttarakhand, Uttarakhand Renewable Energy Development Agency (UREDA) has been providing electricity to villages located in remote and far-flung areas through decentralized off-grid micro-hydro projects (MHPs). About 42 MHPs having cumulative capacity of 4,210 kW (4.2 MW) have been constructed so far and are providing electricity to about 136 villages and 148 hamlets. UREDA has adopted an approach that calls for greater communities/society participation towards establishing and management of these MHPs. Electricity is being used at the household as well as commercial level. However, in order to assess economic development in these areas due to access of electricity has not been thought about or has limited research.

Under this context, a study was undertaken to investigate whether MHPs have led to productive use of energy and in turn led to economic development in local area. The research presented in this report has sought to explore the question through a review of existing literature, filed survey that included semi-structured interview and informal group discussions. The survey was conducted at five micro-hydro sites and villages who are beneficiaries of the power plants. These sites are Milkhet, Ramgaad, Toli, Taluka, and

Istergaad. The sites were selected where some cognizable instances of use of micro-hydro power for productive purposes were reported.

While there are some evidences of positive relationships between access of electricity and productive uses of energy, it has not been possible to directly establish relationship between level of access of electricity

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Picture 1: Availability of flour mill in the village has relieved women of grinding wheat/grains, etc.

and economic development. The relationship is ambiguous and localized in nature.

There are few cases, as mentioned below, of use of power generated through MHP may be treated as the cases having resemblance to productive use of energy:

- People/women undertake threshing work in the night/ people undertake grading/ cleaning/sorting of farm produce (2.2%)—mainly Jakhana, Gogina, and Taluka
- Due to availability of flour mill in the village, women are relieved of grinding wheat/ grains, etc. manually (3%)—mainly Milkhet, Toli, Bursole, Ramgaad (Picture 1)
- Has enabled taking up sewing work through electrically driven machine (0.6%)—mainly Ramgaad and Istargaad
- It is now possible to setup small enterprises (0.2%)—mainly Milkhet
- Enables lifting of water from lower level through use of pump for minor irrigation (0.4%)—mainly Ramgaad (Picture 2)

- Carpenters are able to use electrically driven plainer (0.2%)—mainly Ramgaad (Picture 3)
- Some people in the village have got employment (0.4%)—mainly Leeti
- Welding facility becomes available within the village itself (0.2%)—mainly Gogina.

**On a social development front, majority of the respondents highlighted the gains relating access of electricity, such as children now getting extra time in evening for their study, women save time as now extra hours are available to them in late evening and early morning due to availability of light, which they used for disposing of household chores, access to television has resulted in entertainment and infotainment, etc.**



Picture 2: Productive use of energy in the sense that it enables lifting of water from lower level through use of pump for minor irrigation



Picture 3: Carpenters using electrically driven planer



Picture 4: Helping community to get employment through energy access

Overall, in terms of the definition of productive use of energy, there are rare cases that may be termed as productive use of renewable energy. The research highlighted three major findings:

- Access to electricity is virtually used for consumptive purposes across the entire state.
- Use of electricity for productive purposes is hardly made except for a few cases
- Frequent breakdown of power plants has also prevented any attempt of productive uses of energy by local people.

The study has also highlighted unidirectional causality running from economic growth to electricity consumption. In religious places, such as Gangotri and Yamunotri, many enterprises in the form of hotels, restaurants have mushroomed up. Due to requirement of electricity for the temple, government has established micro-hydro power plants mainly for consumptive purposes. However, access to electricity has also resulted into increased hours of operation in the markets, less dependency on diesel in the market, pilgrims are able to reach

the temple during night time, safety of women is enhanced, and protection from wild animals ensured.

The findings have also revealed that profitability of micro-hydro power plants sometimes increases due to intermittent uses of electricity for commercial purposes, such as wood cutting during the construction of houses, use of welding machines during construction of houses, marriage ceremonies where power plants charged fixed cost and made some profit. However, these uses are not consistent.

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Based on the above findings, the research has strengthened past research outcomes where combining electricity access with other enabling

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factors to achieve economic development has been reiterated. It is clear that access to electricity is important but its contribution has to be matched by particular needs of the communities, access to finance, skill development, and market linkages (Picture 4). **AU**

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