

IMPROVING ENERGY ACCESS IN RURAL AREAS

How to incentivize the transition to modern energy solutions in rural India

Access to energy remains a critical issue around the globe. At least 1.3 billion people worldwide do not have adequate access to electricity. Due to the unreliability of the electricity supply, power outages are frequent in many rural areas across the developing world where 84% of those without connection to power grids reside. Moreover, 2.6 billion people globally are unable to access clean cooking technologies.

India is among the countries most affected by these challenges. India faces an enormous energy poverty challenge with around two-thirds of its population dependent on traditional bioenergy-based cooking and heating while around 45% of its households lack access to electricity. To augment energy access, the Indian government has launched several energy programs. However, these initiatives are still falling short of ensuring a transition to modern energy systems. It is therefore critical to devise strategies that enable rural households to transition towards a smart mix of modern energy sources.

This policy brief summarizes insights from research conducted in India which investigated the factors that drive the adoption of modern energy in the country.

Energy solutions promoted through governmental policy need to be adapted to the local Water-Energy-Food Security Nexus. Solutions focusing on the water-energy-food nexus recognize the complex linkages between energy production and usage and their effect on food security, sustainable land and water usage as well as the economic status of households. Given that around 70% of rural Indian households are dependent on agriculture, ignoring energy-food production linkages will undermine energy initiatives.

The example of subsidized liquefied petroleum gas (LPG) connections provides a useful illustration of this point. The Indian government distributed free LPG connections to poor households, requiring households to only pay for the gas they use. However, the program fell far short of expectations due to several contextual factors which disincentivize uptake.

Rural households with cattle stocks, for instance, prefer to use traditional bioenergy in the form of cattle dung due to its easy availability. In this context, technologies such as improved bioenergy cooking stoves or biogas may have proven more advantageous. On the other hand, providing a subsidized biogas plant to a household with few livestock would likely not be successful.

POLICY RECOMMENDATION

- **Promote rural energy development strategies** that create synergies between households' agricultural household production and their energy utilization.
- **Encourage local entrepreneurs**, with their knowledge and understanding of the local context, to assist in the dissemination of governmental support to energy initiatives and generate rural employment.

Households located closer to markets are more likely to adopt modern energy solutions. With every 1 km increase in market distance, the probability that a household consumes modern energy as their primary cooking fuel decreases by 1.5%, and the probability of using modern lighting decreases by 3.1%. Closer proximity to markets offers additional livelihood opportunities as well as increased contact with modern technologies which lead to superior adoption rates. Remote households struggle with access to information which poses an obstacle to any robust adoption of modern energies. Therefore, the appropriateness of modern energy solutions needs to be assessed for each specific category of household.

POLICY RECOMMENDATION

- **Governments should promote strategies to bring marginalized communities towards the center of development**, connecting



them through investments in infrastructure such as roads, employment schemes, as well as by developing education and entrepreneurial skills.

Local bioenergy markets can incentivize and facilitate the utilization of modern cooking energy.

In particular decentralized modern energy systems hold great potential in this regard. Households rich in bio-energy resources (i.e. large landlords) can sell their surplus residues to decentralized energy providers and use the resulting income to pay a cash wage to local agricultural laborers (instead of paying them in bioenergy residues). The advantages of this approach are two-fold. On the one hand, it will increase the paying capacity of poor households for energy services. On the other hand, the local sourcing of energy feedstock will result in cheaper modern energy production, thereby benefitting both rich and poor households alike. To date, community-based energy programs have had limited success in India. Creating such institutional mechanisms can bring in stakeholders from all categories of village households into the energy system. Furthermore, the participation of an external entrepreneur could bring confidence and respect for the rules of the energy system.

POLICY RECOMMENDATION

- **Promote decentralized energy initiatives** by combining community-based approaches with an entrepreneurial approach to enhance their overall sustainability.

Strategies to promote modern energy solutions need to take into account the social context.

The adoption of modern energy technologies can be catalyzed by improving women's education to raise awareness of the harmful effects of traditional cooking energy on household members. Education also has a pronounced effect on male heads of household by increasing livelihood opportunities and income and thereby demotivating bioenergy collection. Misunderstandings regarding government energy policies also need to be addressed. With their respective policies, governments past and present have created the expectation among rural populations that household energy must always be government subsidized or provided free of charge. This hinders private sector expansion in the rural energy space. For instance, a government-support solar energy scheme failed after most beneficiary households defaulted on their loan repayments expecting to receive a government bailout.

POLICY RECOMMENDATION

- **Provide capacity building and education for women and girls** to increase their participation in decision making and thereby catalyze household's modern energy transition.
- **Undertake rural awareness programs on modern energy** through government channels and other relevant organizations.

This Policy Brief is based on the studies:
 Gaur V. (2018) Determinants of household's modern cooking and lighting energy transition in rural India –Exploring household's activities and its interactions with other households, ZEF–Discussion Papers on Development Policy No. 256, Center for Development Research, Bonn
 Djanibekov U. and Gaur V. (2016) Assessing nexus effects of energy use in rural areas: the case of an inter-and intra-household model for Uttar Pradesh, India, ZEF–Discussion Papers on Development Policy No.225, Center for Development Research, Bonn
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