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# How to Make Sure Rural Electrification Actually Powers Economic Development

**Summary:** While it may be easy to assume that electricity inevitably fosters economic development, recent research has found that, in many cases, rural electrification has had surprisingly limited impacts on living standards [1], [2]. This memo suggests complementary measures that could maximize the benefits of rural electrification and ensure that it actually alleviates poverty.

## Subsidize electrical appliances

The economic benefits of electrification can only be realized when electricity is put to productive use. Access to a grid connection or an off-grid system does not mean rural households or businesses also have access to the financial resources to purchase new electrical appliances or equipment. Programs that provide electricity without an immediate practical application often result in underutilization. Studies show that, in Kenya and Bangladesh, wealthier households gained more from rural electrification efforts than less wealthy households, as they were better positioned to buy electrical appliances [3], [4].

**Policy Action:** Support household and firm purchases of electrical appliances, e.g., through subsidized loans. One positive example of pairing electrification with support to purchase appliances is the 1930s US rural electrification program, which is shown to have increased income. The program financed electricity generation, transmission, and distribution in rural areas via government loans. Its effectiveness partly stemmed from concurrently offering government-funded low-interest loans to purchase electrical appliances [3]. A variety of appliances, including milking machines, refrigerators, water heaters, sewing machines, and washing machines, enhanced household and farm productivity.

## Disseminate information on productive uses of electricity

While residential electricity use is important, electrification's potential to generate income and galvanize long-term economic growth lies in its non-residential consumption. Therefore, having firms that utilize electricity for production is crucial to harnessing rural electrification's full benefits. A study in India found no economic gains from electrification in small villages but found gains in larger villages because they had more firms [1].

Limited awareness of the potential transformative uses of electricity can also curb the effectiveness of rural electrification. The information barrier is particularly salient in rural areas given the baseline low levels of electricity and, hence, little familiarity with its uses. A 2009 study in rural Benin concluded that households and firms underutilized electricity due to a

lack of awareness about its potential uses [5]. For instance, despite potential productivity gains from using electricity to power machines, firms mainly used electricity for lighting.

**Policy Action:** Disseminate information and encourage productive uses of electricity, particularly in newly-connected communities. Some World Bank rural electrification projects include the promotion of productive uses through outreach to small businesses [6]. For instance, in Indonesia's rural electrification project, the power utility partnered with local NGOs to disseminate information on uses of electricity to rural businesses via radio communications, community meetings, field visits, and demonstrations of the use of electrical equipment [7]. Similarly, Peru's rural electrification program promoted productive uses of electricity, which led to the adoption of electrical equipment for processing food commodities, wood, and metals, as well as for pumping water for agriculture [8]. The success of the 1930s US electrification program was also partly due to an information campaign on the productive uses of electricity, such as storage and irrigation [3].

## Build complementary infrastructure

Complementary infrastructure, such as roads, enhance the economic impact of rural electrification programs. Electrification can power production processes, but these production processes require inputs, and the output from production has to be subsequently sold in markets. Transportation infrastructure boosts development by enhancing market access, complementing the role of electricity in production.

**Policy Action:** Implement an integrated infrastructure framework that complements electricity with other infrastructure. For example, the Kalangala Integrated Infrastructure Programme in Uganda developed roads, ferries, water supply systems, and power plants in the Kalangala fishing town, making it one of the wealthiest regions in the country due to its easy access to markets, fish processing facilities, and refrigeration capabilities [9]. Studies on rural India and sub-Saharan Africa also find synergies between electrification and road access [10], [11], [12]. Access to both electricity and roads yields greater increases in production and employment than access to either alone.

## Improve reliability and affordability

Connecting villages to the grid cannot improve development outcomes if consumers are unable to afford electricity or if it is of poor quality due to frequent outages. To cope with [outages](#) and high [prices](#), firms may switch to less electricity-reliant production processes, leading to a reduction in productivity and growth. Studies in India and Ghana have found output and productivity are negatively affected by high electricity prices and outages [13], [14], [15].

**Policy Action:** Increase electricity reliability and affordability through investment planning to align generation with growing energy demand, carefully targeting subsidies to the poorest consumers to minimize waste and financial burden, making utilities financially viable through measures such as prepaid metering to reduce theft and non-payment, and smart metering to detect electricity quality issues. Successful interventions include the use of prepaid metering in

South Africa, which reduced utilities' revenue recovery costs [16], and smart metering in the Kyrgyz Republic, which improved electricity service quality [17].

## Conclusion

In assessing electrification programs, it is important to recognize that the full economic benefits of rural electrification may only occur in the long term and only after the root causes of the limiting factors are addressed. Further research on the effectiveness of these complementary actions and policies can help design successful and economically effective rural electrification programs.

## Endnotes

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