

Rural Electric Power: Evaluation of Household Electricity Connections in Kenya



Over the past century, rural electrification has served as a key benchmark for economic development and social progress. Researchers conducted a randomized evaluation to measure the impact of offering subsidies to connect to the power grid on the demand for rural electrification in Kenya. The study finds that demand falls rapidly as connection price increases, and that supply costs are very high. As a result, rural electrification may reduce social welfare in this setting. Beyond price, issues of credit constraints, bureaucratic obstacles, and poor performance of the electrical utility may lower household demand for electrification.

Policy Issue

Investments in infrastructure, including transportation, water and sanitation, telecommunications, and electricity systems, are primary targets for international development assistance. Access to a well-functioning energy sector can be critical for sustained economic growth at the macroeconomic level, and recent initiatives to restructure electricity markets have focused on the transmission and distribution of electricity. However, though large-scale infrastructure investments in electrification may have long-run benefits for economic development and climate change, they can come at the expense of other large public investments. The extent to which increases in energy access should be driven by investments in large-scale infrastructure, such as grid connections, or small-scale decentralized solutions, such as solar lanterns and solar home systems, remains contested. To make informed decisions about the relative attractiveness these investments, policymakers need information about projects' costs and benefits and their likely impacts on citizens' welfare. While development economists have begun to measure the economic impacts of various types of infrastructure investments, little empirical evidence exists linking the demand-side and supply-side economics of these investments.

Evaluation Context

In recent years, the government of Kenya has dramatically increased coverage of the electric grid. The driving force was the creation in 2007 of the Rural Electrification Authority (REA), a government agency established to accelerate the pace of rural electrification. REA has prioritized the connection of public facilities such as market centers, secondary schools, and health clinics. Under this approach, public facilities not only benefitted, but also served as community connection points bringing previously off-grid homes and businesses within close reach of the grid. While only around five percent of rural



RESEARCHERS

Ken Lee, Edward Miguel, Catherine Wolfram

COUNTRY

Kenya

PARTNERS

Kenya Rural Electrification Authority, World Bank, Center for Effective Global Action (CEGA)

PROGRAM AREA

TOPICS

Access to Markets, Environment, Product Pricing

TIMELINE

2013-2015

households in the country have electricity as of 2009, the majority are now “under grid,” which means they are within connecting distance of a low-voltage line. As a result, last-mile grid connectivity has emerged as a political priority in Kenya.

In the previous decade, any “under-grid” household in Kenya within 600 meters of an electric transformer could apply for an electricity connection at a fixed price of 35,000 Kenyan Shillings (\$398). While below the cost to supply the connection, this is a very high price in a setting in which most households’ annual income is below \$1,000. This evaluation took place at the tail end of the previous price regime, and the Ministry of Energy and Petroleum has since reduced the price through subsidies.

Details of the Intervention

Researchers conducted a randomized evaluation to measure the impact of offering subsidies to connect to the power grid on the demand for rural electrification in Kenya.

Working closely with REA, researchers randomly selected 150 transformer communities—groups of households located within 600 meters of a transformer—in Busia and Siaya, two rural counties in western Kenya. To limit construction costs, REA requested that researchers restrict the final selection of households to the 85 percent within 400 meters of a transformer. From that group, researchers randomly selected 2,289 “under-grid” households to participate in the evaluation, with roughly 15 households in each community. Researchers then randomly assigned half of the communities to receive three different levels of subsidies for electric connections and half to serve as a comparison group. Within those groups, households received the following subsidy offers between May and August of 2014:

- *High subsidy group*: 380 unconnected households in 25 communities were offered a 100 percent subsidy resulting in an effective price of \$0.
- *Medium subsidy group*: 379 unconnected households in 25 communities were offered a 57 percent subsidy resulting in an effective price of \$171
- *Low subsidy group*: 380 unconnected households in 25 communities were offered a 29 percent subsidy, resulting in an effective price of \$283
- *Comparison group*: 1,150 unconnected households in 75 communities faced the regular connection price of \$398

Households were given eight weeks to accept the offer and deposit full payment into REA’s bank account. Treatment households also received an offer for a free prepaid electricity meter and basic household wiring kit with a light bulb socket, two power outlets, and two circuit breakers. After verifying payments, REA began connecting households to the grid with an average time of seven months to complete the connection.

Results and Policy Lessons

The price to join the power grid strongly impacted households’ decisions to purchase a connection. Nearly all (94 percent) of the households offered a free grid connection took up the offer, but demand fell sharply with lower subsidies. In the medium subsidy group only 23 percent of households chose to connect and 6 percent of households in the low subsidy group chose to purchase a

connection—relatively close to the 1 percent of households in the comparison group who paid full price.

Apart from price, issues related to credit constraints, bureaucratic obstacles, and low electrical grid reliability may have diminished household demand for electrification. Audits of the electric contractors work revealed over-reporting of labor and transport costs and some evidence of leakage in the form of missing electrical poles. These findings suggest that electric grid construction costs may be substantially inflated due to mismanagement and corruption in Kenya, pointing to the possibility that improved monitoring and enforcement of contractors could reduce costs and possibly improve project quality and safety.

Taken together, low consumer demand in the context of high grid connection costs indicate that the electrification program may have resulted in a negative net social benefit. However, universal access to electricity may still increase social welfare overall by exposing individuals in rural areas to more media and information, allowing children to study more, or facilitating work outside subsistence agriculture. Such outcomes have not been the focus of electrification efforts to date and researchers and policymakers many need to consider them to justify rural electrification as a development priority given these study findings.

GLOBAL HEADQUARTERS

101 Whitney Avenue
New Haven, CT 06510 USA
+1 203.772.2216 | contact@poverty-action.org

poverty-action.org