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Zimbabwe Hopes Rural Electrification Can Stop Deforestation. Here's Why It Might Not Work

Researchers say bigger issues — poverty, corruption, inequality — can undermine rural energy programs if unaddressed.

By **Maria Gallucci**

Photo: Jekesai Njikizana/AFP/Getty Images

A man rides his bicycle past stumps of hardwood Mopani trees that shape part of a deforested landscape in Mhondoro Ngezi district. They were intentionally burned down because they were too big to easily chop down with axes.

In Zimbabwe, where access to the electrical grid is sparse and unreliable, millions of people still burn wood to cook food and heat their homes. The practice is partly to blame for worsening deforestation in the landlocked country. In recent years, government officials have proposed a seemingly straightforward solution: Extend the electric grid into rural villages, and reduce the use of wood for fuel.

But Ellen Fungisai Chipango, a Zimbabwe-born researcher, says that rural electrification isn't likely to provide any quick fixes. That's because adding poles, wires, and even off-grid solar systems will do little to alleviate the crushing poverty that leads people to cut large swaths of trees. In her field work, she found that initiatives to expand energy access in Zimbabwe often overlook the larger political and economic forces at play.

Chipango is among researchers worldwide who are closely examining long-held assumptions that electrifying rural homes can boost family incomes, help children study, reduce indoor air pollution, or protect the environment. Stakeholders including scrappy solar startups, major oil and gas companies, and the United Nations have all pledged to work toward improving energy access for one or more of those reasons. But recent studies suggest that, in order to deliver real benefits, programs must be more comprehensive.

"Without addressing these underlying factors, just extending the grid to rural people will be tantamount to an empty gesture of goodwill," Chipango said by Skype.

Chipango is a postdoctoral research fellow at the University of Johannesburg in South Africa. She recently discussed her findings in an article in The Conversation. Her piece, published in July, updates a case study she conducted in late 2016 and early 2017 in a district of Zimbabwe's southeastern Manicaland province.

Over two-thirds of Zimbabwe's 16.2 million people live in rural areas, and roughly 80 percent of those residents can't access electricity. In 2002, Zimbabwe created the Rural Electrification Agency to rapidly electrify the countryside. So far, the agency has connected thousands of schools and rural health centers. Yet few power lines extend beyond institutional buildings, and only about 10 percent of villages are electrified.

"It will give us light, but light does not put food on the table."

—a resident of rural Zimbabwe, referring to electrification in impoverished areas

In Chipango's study, most participants said they burned wood for cooking and heating. But personal energy needs were only part of the reason why they chopped down trees. Many people are clear-cutting forests out of sheer desperation. Zimbabwe's economy is on the brink of collapse, and a prolonged drought—made worse by climate change—has brought about the worst hunger crisis in a decade. Rural residents stave off grinding poverty by selling wood. Their customers include city dwellers, who, because they can't afford diesel generators or battery backup systems, burn the fuel during frequent and prolonged power outages.

When Chipango interviewed participants again earlier this year, she found their economic situations had worsened since 2017. Meanwhile, urban demand for wood has surged. Interviewees said they'd still keep cutting trees even if power lines finally arrived in their villages. One resident, when asked if off-grid solar would help instead, told Chipango: "It will give us light, but light does not put food on the table."

Poverty also limits the potential of rural energy initiatives in other ways. If residents can't afford to buy electric stoves, heaters, or other appliances, they can't take full advantage of the electrons flowing into their homes. Certainly, enterprising people with a little cash on hand can grow their income by setting up neighborhood phone-charging shops or converting their yards into makeshift movie theaters. But many people won't likely see their living conditions improve so easily.

"For almost all the traditional outcomes that people talk about when expanding energy access, there are two or three other things that people need for that outcome to actually be realized," said Ken Lee, who leads the India division of the Energy Policy Institute at the University of Chicago (EPIC). "You can't eat electricity," he added.

Lee and colleagues led an experiment in Western Kenya comparing the experiences of rural "under grid" households, meaning homes that are located next to, but not connected to, utility infrastructure. Kenya's Rural Electrification Authority connected randomly selected households, at a cost of more than US $1,000 each; the rest remained disconnected. After 18 months, researchers found no obvious differences between the socioeconomic living standards of both groups. (Aspects of the Kenya experiment are ongoing.)

The initial results, published in March, surprised the team, which expected to see more tangible gains among the electrified households. Not only did budget constraints keep many participants from buying appliances and using the new electricity supply, researchers also found little improvement in children's test scores. Even if kids could study under a lightbulb at night, they still attended underfunded schools in the morning.

Utility mismanagement further undermined electrification efforts. During the rural grid expansion, nearly one-fourth of all utility poles were apparently stolen, possibly leaving the connected residents with a less reliable power supply in the long-run.

Globally, the problem of faulty equipment and lack of maintenance plagues many rural initiatives, including efforts to replace polluting indoor cookstoves with cleaner or electric models. In northern India, studies found that households revert to traditional stoves when new stoves break down. Sometimes, they use both at once, in a process known as "stacking" that undermines the health benefits of alternative models.

Lee and fellow researchers Catherine Wolfram and Edward Miguel, both of the University of California at Berkeley, also reviewed studies from other locations globally and reached a similar conclusion: Access to electricity alone isn't enough to improve economic and noneconomic outcomes in a meaningful way.

Still, Lee stressed, that doesn't mean utilities, philanthropists, and companies should stop pursuing programs to bring grid power or off-grid technologies into rural and impoverished places. But it does clarify the need to design initiatives that do more than simply install infrastructure and assume the rest—rising incomes, better education—will naturally follow.

Chipango, reflecting on her Zimbabwe study, put it this way: "Energy access is not the mere presence of a grid. It's the ability to use that energy."

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IEEE Spectrum's energy, power, and green tech blog, featuring news and analysis about the future of energy, climate, and the smart grid.

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