



No. 230 March 2021

Small-scale off-grid energy systems: Improve productivity by increasing women's access to electricity in rural Nigeria

By Opeyemi Akinyemi, Temilade Sesan, Omobola Adu, Babajide Sokeye, Cyprian Longtar, Ngozi Chimdi-Ejiogu and Claude Sinzogan

Key messages

- Implementing policies that increase rural women's household and farm productivity alongside the Rural Electrification Fund capital subsidies for mini-grid developers can increase women's income and household well-being.
- Deploying small-scale, off-grid technologies—particularly standalone solar home systems and solar lamps—in addition to mini grids can increase electricity supply for women's domestic and farm work, according to examples from other countries.

Women's limited access to electricity stifles productivity and development

Less than a quarter of people living in rural areas of Nigeria have access to electricity. Without sufficient electricity access, household and farm productivity is stifled, and migration to urban areas is rife. These circumstances are dire for everyone, but especially so for rural women who provide the greatest share of household and farm labour yet are the poorest. When women have access to time- and labour-saving devices, such as domestic electrical appliances and mechanised farm equipment for processing, they can significantly increase their productivity.

So far, government policies and programmes to increase rural electrification have not taken into account the situation and needs of women. The current Rural Electrification Fund (REF) policy prioritises providing capital subsidies to firms that are investing in mini-grid development. However, little is known about how the policy affects rural productivity, especially women's productivity.

Ignoring how women's circumstances and needs differ to men's means the expected costs and benefits of the REF are likely to be incorrect. Furthermore, taking a gender-aware approach to evaluating the situation can result in comprehensive rural electrification policies that increase the efficiency and productivity of women, which in turn enhance household welfare and promote the government's objective to support economic and social development in rural areas.



Photo: David Stanley

Policy options to increase women's electricity access

To identify how best to expand Nigeria's rural electrification in a way that works for women, a team of local PEP researchers compared the current "subsidy only" policy pursued by the REF to alternative "subsidy plus productivity" scenarios.

Subsidy only (Scenario 1): The current policy provides 50% capital subsidy grants to mini-grid investors to encourage private participation. The subsidy is expected to lower the final cost of electricity to rural customers, and subsequently increase demand.

Subsidy plus productivity: Combining the current capital subsidy with policies that increase productivity. These should enable rural energy users, especially women, to convert the time that electrical appliances save on household work into increased farm productivity and higher incomes:

- **Scenario 2:** Electricity access results in a 10% increase in productivity for household tasks (alone).
- **Scenario 3:** Electricity access results in a 10% increase in productivity for agricultural tasks (alone).
- **Scenario 4:** Electricity access results in a 10% increase in productivity for household tasks and for agricultural tasks

Key findings

A combination of the subsidy grant and complementary policies that enhance women's domestic and farm productivity (e.g. expanding access to small-scale, decentralised energy technologies) provides the most benefit for rural women in Nigeria.

	Policy scenarios			
Effect on:	1. rural electricity subsidy (current REF policy)	2. 10% increase in productivity for household tasks	3. 10% increase in agricultural productivity	4. Combination of scenarios 1-3
Rural women's time spent on domestic work	≈ 1.0% reduction	≈ 0.8% reduction	≈ 0.14% increase	≈ 1.5% reduction
Rural women's employment	+0.65%	+0.51%	-0.10%	+1.01%
Rural women's income	+0.30%	+0.51%	+0.81%	+1.57%

Source: Authors' analysis

The main avenue through which increased electricity access can benefit rural women in Nigeria is a reduction in the amount of time they spend on household work. While this effect is more or less constant, the amount of time saved on household work and the resulting increase in income vary according to where the productivity gains are focused.

Scenario 1: The 50 percent capital subsidy provided by the REF reduces the unit cost of electricity compared to the baseline in previously unelectrified areas and increases demand for electricity services. On its own, however, this policy is not the best for maximizing the productivity and income gains that increased electricity use can provide for women.

Scenario 2: If the subsidy described in Scenario 1 provides an increase in electricity access that increases women's efficiency in performing household tasks by 10 percent, women gain some time they can spend on economic activities. This would lead to bigger income increases than under Scenario 1.

Scenario 3: Assuming availability and reliability of electricity thanks to the subsidy, which increases farm productivity (e.g. processing) by 5 percent, rural women's income increased while economic activities marginally declined.

Scenario 4: Combining the 50 per cent capital subsidy with policies that produce a 10 percent increase in the productivity of households and a 5 percent increase in agricultural productivity (i.e., Scenarios 1-3) results in the **largest reduction in women's time spent on domestic tasks**, and the greatest improvements in economic outcomes.



Photo: Havenhill Synergy Limited



Photo: Havenhill Synergy Limited

Policy road map

To increase household and agricultural productivity among rural women within the remit of the REF, it is vital to **combine the subsidy grant with complementary policies and diversify the technologies within the REF portfolio**.

In addition to the current focus on mini grids, smaller-scale, decentralised energy technologies (in particular, standalone solar home systems and solar lamps) should be distributed more widely. These technologies have significantly lower costs for the government and rural women.

To diversify energy technologies for the rural populations within the REF:

1. In conjunction with the Ministry of Science and Technology, the REF needs to **determine which technologies are most appropriate to the rural contexts** in which they will be deployed.
2. The REF needs to **earmark funds to stimulate rural demand** for the small-scale technologies identified. The National Assembly allocations and state government budgets provide potential sources of funding.
3. To arrive at a dissemination strategy that is effective and equitable, the REF needs to **identify target groups and communities** in collaboration with the Ministry of Women Affairs & Social Development and the Ministry of Agriculture & Rural Development.



Photo: Russell Watkins/Department for International Development

Research project

A team of local PEP researchers sought to assess how Nigeria's Rural Electrification Fund affects men and women differently.

The researchers investigated the impact of expanding rural electrification on rural women's employment by simulating four scenarios using a gendered Computable General Equilibrium (CGE) Model that was calibrated to a 2010 Nigerian gendered Social Accounting Matrix (SAM).

The dataset incorporated quantitative data from the World Bank Nigeria General Household Survey).