Home solar systems in South Africa: more will be installed if households are given loans, free maintenance and security

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South Africa is making efforts to increase the use of solar photovoltaic energy. But it's happening at a very slow pace.

Solar photovoltaic contributes less than 5% to the country's energy mix, despite the sunny climate, which is very favorable for solar photovoltaic energy generation. So far, less than 10% of households have started using solar photovoltaic power regularly, though evidence suggests rapid uptake in the last few years with a 349% increase in rooftop solar PV capacity from 983MW in March 2022 to 4412MW in June 2023.

South Africa urgently needs to change this. It is highly dependent on coal fired power stations—about 85% of power is derived from fossil fuels. In addition, for the last decade it has faced increasingly severe power cuts. The rapid adoption of solar power could alleviate the pressure.

The government has taken steps to improve the situation. In its 10-point energy plan, published in 2022, it relaxed the requirements needed for private power generation. The government also introduced tax rebates for solar panel installations starting from March 2023.

As environmental scientists who focus on sustainable energy and household energy consumption, we conducted a scoping review to examine the barriers to household solar adoption in South Africa.

We grouped the key problems we found into financial, personal, institutional, technical and societal barriers.

We concluded that without addressing these problems, home solar power will remain a source of energy for the economically privileged only. Transitioning away from coal-fired power to renewable energy will remain a pipe dream in the country with the highest income inequality in the world.

Financial barriers

Our review found that financial barriers were the main reason many households had not adopted solar photovoltaic energy.

Electricity price increases that are meant to fund the state owned electricity company Eskom are hitting low-income families hard. But switching to solar is too expensive for this cohort of South Africans. The current solar rebate refunds homeowners in South Africa 25% of their new panel costs to a maximum of R15,000 (about US$826). Without upfront financial support, start-up and maintenance costs are quite high.

Poor households cannot get solar loans because they do not have assets as collateral. Similar barriers have also been reported in countries like Pakistan, Nigeria, Uganda and other developing countries where the high initial costs of solar energy make it hard for people to switch.

Personal barriers

Personal barriers also contribute to low adoption of solar photovoltaic among households. We found a number of examples:

- A lack of knowledge. Little solar photovoltaic information is available. For example, some social housing households received solar water heaters but were not trained in how to use them. Eventually they broke down, which caused disappointment and frustration, and scared off other people who wanted to install solar geysers.
- A negative perception of solar photovoltaic energy. Some households perceived it as a weak form of energy which would not meet all household needs.

Institutional barriers

Our research found that municipalities and Eskom did not really support solar photovoltaic adoption because they make money from selling coal-powered electricity. When people switch to solar photovoltaic energy, Eskom and municipalities lose income. For example, researchers found that Stellenbosch municipality would lose up to 2.4% of its revenue per year if households switched to solar energy.

Another institutional barrier is the absence of clear and strong renewable energy policies in South Africa. For example, in 1999 the government rolled out solar home systems for a very small monthly fee to maintain the systems. But this project failed because there were no clear policies to guide the distribution of the systems, which led to corruption.

Technical barriers

Factors such as the breaking down of equipment, difficulties in finding spare parts, and lack of maintenance services were the main technical barriers highlighted in our review.

Some solar home systems that were donated through government projects broke down due to wear and tear. Getting spare parts was expensive and time-consuming as they had to be imported from abroad.

Similar problems were reported in other African countries like Guinea-Bissau and Nigeria. Unlike developed countries, where spare parts are more readily available, developing nations often struggle due to a lack of local manufacturing.

Social barriers

Social barriers such as theft were some of the reasons why households were not willing to shift to solar photovoltaic energy. For example in the Solar Home System Electrification Programme pilot project in remote Folovhodwe village and the Vhembe district in South Africa's northern Limpopo province, theft of solar panels and equipment was very common. Residents believed this was because they were easy to steal. Therefore, people in those areas did not want to invest in solar energy.

Next steps

The first step needed is for the government to offer solar loans, power purchase agreements, subsidies and rebates. In the Seychelles, one of only four countries in Africa where all households have access to electricity, interest-free loans for solar geysers have been offered in the past.

The second step is education about the benefits of solar photovoltaic systems. This could happen at community meetings, on social media, and in the school curriculum. Solar photovoltaic companies also need to make sure people get the solar systems that are the right size for their needs and give them enough information before they install them.

The third step is for companies selling rooftop solar to offer ongoing support and maintenance to their customers. South Africa also needs to invest in creating more solar photovoltaic industries and train more technicians to do the job.

The final step is that security features on solar panels must be improved. Solar panels should be sold with motion sensors, floodlights and fasteners to prevent theft, and these security features should be subsidized by the government.

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