

A photograph of a traditional thatched-roof house with a solar panel mounted on it. The solar panel is rectangular and blue, with a grid of cells. It is mounted on the thatched roof, which is made of dried grass or straw. The house is made of wood and has a thatched roof. The background shows some green trees.

# Rural Households' Perceptions of Rooftop Solar Photovoltaics

**Rural communities in South Africa have the potential to adopt renewable energy resources such as solar photovoltaics, but they are not adequately harnessed.**

Globally, about 2.7 billion rely on traditional fuels to meet household energy needs. This problem is more pronounced in rural areas. To improve the affected people's quality of life and reduce dependence on traditional biomass, governments and other stakeholders are pushing towards transitioning rural and unelectrified populations from using traditional biomass to renewable energy sources. In South Africa, rural households are connected through Integrated National Electrification Programme (INEP) via a fee-for-service programme. In partnership with the private sector, an indigent is connected to a solar home system with a capacity of 50kWh. The programme was established to have covered 300 000 households by 2012 with the capacity of generating 10 000GWh by 2013. Strikingly, by 2012 only 46 000 families were using the solar home systems. This failure is partly blamed on the failure of programme planners to factor in communities' views, attitudes, and perceptions of the technology. This research unpacks current energy sources, types and rural communities' perception of using solar home systems as an alternative energy source in the scattered and unelectrified communities of South Africa.

## Methodology

The study was conducted in Dhuvhuledza, Mbahe and Tshamutlikwa, rural villages in Thulamela Municipality of Vhembe District in South Africa. Thirty (30) households, ten

(10) per village were purposively sampled via a case study design. The main inclusion criteria were prior participation in the Solar Home System (SHS) Electrification Programme implemented by the Thulamela Local Municipality and Solar Vision Private Limited. Before the actual data collection, the SHS Electrification programme were identified in each village. Out of the identified only 10 were randomly selected per village. The data was analysed using Thematic Network Analysis (TNA) in Atlas ti version 8. All the recorded interviews were transcribed first on a word document. In all instances where the local language (Venda) was used, it was translated into English. The data were analysed using open coding, code by list, and in vivo. The relationship and logical pattern explaining the perceived advantages and disadvantages of adopting an SHS were extracted from the data using the linking and related functions under Network View Manager.

## Key results

Results revealed that rural families use various energy sources, including grid electricity, paraffin, solar photovoltaics, firewood and candles. Additionally, it was revealed that energy needs at the household level ranges from cooking, water heating, indoor and outdoor illumination, refrigeration, fabric strengthening, air conditioning entertainment and space heating.

Table 1: Energy types and their uses in a household in the rural areas of the Vhembe District

Domestic Energy Use	Energy Sources	Frequency	Cumulative Percentage (%)
Illumination	Candles	3	10
	Paraffin lamps	1	3.3
	Battery cells	1	3.3
	Solar photovoltaics	1	3.3
	Grid electricity	22	73.3
Water heating	Solar geyser	1	3.3
	Grid electricity	14	46.7
	Liquified petroleum gas	2	6.6
	Firewood	21	70.0
Entertainment	Battery cells	1	3.3
	Electricity	29	93.3
Cooking	Firewood	24	80.0
	Electricity	17	56.7
	Liquefied petroleum gas	2	6.6
Space heating	Liquified petroleum gas	1	3.3
	Firewood	6	20.0
Airconditioning	Nothing	16	53.3
	Electricity	13	43.3
Ironing clothes	Firewood	8	26.7

Table 2: Rural households' perceptions of solar home systems (SHS)

Perceived advantages of a SHS	Village distribution	Frequency (n=30)	Cumulative (%)
A Solar Home System is not affected by load shedding	Duvhuledza (2) Mbahe (4) Tshamutilikwa (1)	7	23.0
Solar technology is relatively cheap (Installation and maintenance)	Duvhuledza (3) Mbahe (4)	7	23.0
Solar technology is simple and easy to use	Duvhuledza (2)	2	6.7
The energy is derived from a renewable resource- the sun and is environmentally friendly	Duvhuledza (1) Mbahe (1) Tshamutilikwa (2)	4	13.3
Once installed, the SHS does not require regular payments	Mbahe (1) Tshamutilikwa (1)	2	6.7
Solar Home System adoption reduces energy supply-demand on-grid connections	Tshamutshezi (1)	1	3.3

Table 2: Rural households' perceptions of solar home systems (SHS) continued

Perceived disadvantages of a SHS	Village distribution	Frequency (n=30)	Cumulative (%)
A SHS does not work well during cloudy or rainy climatic conditions	Duvhuledza (4) Mbahe (7) Tshamutilikwa (6)	17	56.7
solar equipment is expensive	Duvhuledza (1) Mbahe (11)	2	6.7
Solar PV panels can be stolen easily	Duvhuledza (2) Mbahe (1) Tshamutilikwa (1)	4	13.3
A SHS's efficiency is reduced by the presence of dust particles which are prevalent in the rural villages	Tshamutilikwa (1)	1	3.3
Solar technology produces inferior quality energy, which can power limited household appliances	Duvhuledza (2) Tshamutilikwa (1)	3	10

## Conclusions and implications

Even though the participating families indicated positive perceptions of solar photo-voltaic technology, its proliferation in rural areas is hindered by high capital and maintenance costs. It has been observed that, in the district, the majority of the families in these rural communities rely on government grants. Such people are not considered for essential financial services like insurance, bank loans and others as they do not have a steady income, own a personal bank account and reliable credit history. Thus, SHS providers should not only leverage the financial implications of using unclean energy sources like fossil fuels and biomass but also the financial capabilities of the end-users of the technology. Thus, it is recommended that solar home systems innovators need tailor-made service charges in line with the financial situation of the communities they intend to electrify.

Rural communities in South Africa have the potential to adopt renewable energy resources

such as solar photovoltaics, but they are not adequately harnessed. Currently, the government is subsidising more on-grid connections at the expense of off-grid connections. Central to this is the politicisation of rural electrification in South Africa. In addition, the SHS implementation

programme needs an awareness of the capacity and the system types. Besides the system capacity, the World Bank emphasises that SHS should be evaluated to improve rural communities' energy access regarding availability, reliability, quality, cost-effectiveness, legal, health, and safety. All this information should be shared with rural families who intend or are willing to adopt an SHS.



### Reference:

**Rural Households' Perceptions of the Adoption of Rooftop Solar Photovoltaics in Vhembe District, South Africa**

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