Communication and Marketing Department
Isebe loThungelwano neNtengiso
Kommunikasie en Bemarkingsdepartement

Private Bag X3, Rondebosch 7701, South Africa
Welgelegen House, Chapel Road Extension, Rosebank, Cape Town
Tel: +27 (0) 21 650 5427/5428/5674 Fax: +27 (0) 21 650 5628

www.uct.ac.za

13 February 2024

Most low-income households in Alexandra cannot afford to completely go off-grid

The University of Cape Town researcher and Yale University visiting research scholar Dr Blessings Masuku has published new research in the *Journal of the Development Southern Africa.* Titled "Rethinking South Africa's household energy poverty through the lens of off-grid energy transition", the research found that most low-income households in Alexandra township in Johannesburg cannot afford to go completely off-grid by securing alternative energy sources like Liquefied petroleum gas (LPG) and solar energy.

The findings showed that of the 40 interviewed respondents, most of them use more LPG (36%), followed by charcoal (19%) and wood (16%), and 14% use solar energy. In contrast, most respondents using electricity (13%) were primarily those from formal dwelling units (subsidised government houses) connected to the electricity and water grid. Only 2% of surveyed households in informal dwellings indicated using kerosene stoves for cooking and paraffin lamps for lighting.

"The findings of my research support a previous study, which suggested that despite the availability of modern energy services, households and vendors switch back and forth between energy sources," said Masuku.

According to Masuku, South Africa's economy and commitment to climate change are on the verge of precipice due to the country's ongoing energy crisis. "Hence, it is imperative to reimagine our energy systems, especially at the household level, through the lens of an inclusive "just transition" approach. For more than a decade, South Africa's state-run power utility, Eskom, which generates about 95% of the country's electricity, has been facing a widespread energy crisis, which has now tremendously worsened, with the year 2023 being the highest peak of South Africa's worst electricity blackouts. In 2023, the World Bank approved a $1 billion loan for South Africa to help the country address its ongoing energy crisis that has recorded widespread daily power cuts of up to 10 hours across many regions of the country," he said.

Masuku's study advocates for just energy transitions, which are not seen as just a shift to electricity but all other forms of mechanical energy, including off-grid energy sources such as LPG, biofuels such as wood fuel, charcoal, and solar used by South Africa's low-income households in low-income neighbourhoods and informal settlements.

The paper showed that South Africa is facing unprecedented demographic transition and urbanisation shifts, which have remained a structural challenge to the country's development

in the post-apartheid era, putting much pressure on existing infrastructure, and that infrastructure in most South African cities is barely coping with the current urbanisation trend. "City authorities and local government institutions are not adequately capacitated to cope with the rapid transition of urbanisation trends. The analysis showed that most urban infrastructure in many South African cities is old, decaying and still based on historical legacies of exclusion, and cannot sustain the current urban population growth. This is evident on South Africa's energy grid, which has become a national energy crisis and has plunged the country into striking levels of ceaseless nationwide power blackouts and electricity hikes," Masuku said.

Masuku further said: "South Africa is highly dependent on fossil fuels, with coal constituting 80% - being the largest energy source for South Africa currently. However, since some of the country's coal power stations of Kusile and Kriel are old and in a state of disrepair, actual power generation is substantially lower, resulting in a shortfall of between 4000 and 6000 megawatts which consequently results in loadshedding to save these power stations from total collapse. Corruption and maladministration are exacerbating the situation. It is sad that in a digital era where most countries are embracing the 4th and 5th Industrial Revolution (IR) of advanced technology such as artificial intelligence, South Africa is still battling with energy production, and power crisis, which is a key driver to the world of 4IR. We cannot afford to let this energy crisis define us; we need to catch up with the rest of the world to meet Sustainable Development Goals."

He explained energy poverty as an expenditure-based measure where households spending more than 10% of their income on energy are deemed energy-poor, and energy poverty in South Africa is prevalent, particularly among household dwellers living in rural areas and informal settlements who are affected by issues of affordability and connectivity to grid infrastructure. "Assessing energy-related expenditure as 10% of monthly income, the Multi-dimensional Energy Poverty Index revealed that about 43% of South Africa's population falls into this category, underscoring the extensive prevalence of energy poverty. Currently, South Africa has an electricity rate of about 90%. However, despite the success of the electrification programme in the country, energy poverty at the household level is widespread, with an estimated 3.5 million households that are not connected to the main grid and lack access to electricity. Approximately 60% of these households are situated in remote areas and urban informal settlements where expanding the main grid infrastructure poses substantial logistical and financial challenges," he said.

Masuku shared that energy poverty, not only in South Africa but across the African continent, is increasingly discussed as a subject of important research topics among scholars and an area of policymaking focusing on various dimensions, encompassing factors such as access, reliability, affordability and socio-economic implications, particularly in terms of access to modern energy services. Masuku's paper showed that household energy poverty is aggravated by South Africa's complex web of social and economic factors, including high electricity cost, Eskom's unreliable grid associated with continuous loadshedding, low household incomes, energy inefficiency at homes, among others. He explained that South African households often struggle to cope with these hardships, especially disparities in income distribution played a significant role in elevating energy poverty rates, with lower-income groups contributing more to overall poverty than their higher-income counterparts and severe power cuts being an equally pressing challenge affecting household daily livelihoods, which include food access, preparation and storage.

This analysis aimed to assess alternative and inclusive energy policies currently implemented to address household energy poverty. Although there are direct and indirect government projects that have been implemented to eliminate energy poverty in South Africa which include

Free Basic Electricity (FBE) subsidy – a longstanding government programme enrolled by Eskom and municipalities, capped at 50kWh per month for each qualifying household, was introduced in 2003 to assist indigent households in shifting from using inefficient and unsafe energy fuels to electricity; Integrated National Electrification Programme (INEP) of 2007; and Free Basic Alternative Energy (FBAE) policy which was introduced in 2007 to assist unelectrified households with subsidised alternative energy such as LPG, bio- ethanol gel-fuel, paraffin, solar home systems.

Notwithstanding the positive impact of government energy programmes at the household level, Masuku said there were still gaps, especially in the rollout and coordination of these electrification programmes, leading to electrification backlogs. The research findings showed that policy and governance often overlook the energy poverty patterns and energy needs of low-income households and continue pushing for the agenda of connection to the electricity grid in addressing energy poverty, which in practice has proven to fail in solving urban energy poverty, especially at the household level.

Masuku said that tackling energy poverty in South Africa is a complex issue requiring more than just providing energy access to low-income households. "This means understanding the essential infrastructure needs, infrastructure use and infrastructure patterns of the urban poor. As such, this will enable appropriate, informed, and targeted policy interventions aimed at improving the welfare of the urban poor through improved access to urban infrastructure services that are safe, reliable and affordable," he said.

The findings in Masuku's research showed that the indigent energy policies of FBE and FBAE, provided by the local municipalities and Eskom, have been grossly criticised for their inadequacy in meeting households' basic energy needs. "The approach taken by municipalities to roll these pro-poor sub-energy policies is vague regarding how the municipalities determine which households qualify to benefit from these subsidies. Solar Home Systems (SHS) are implemented as a suitable temporary alternative to grid electricity, and qualified families are said to receive an 80% capital subsidy from the government. However, the practical implementation of such systems in remote and low-income communities encounters significant challenges due to their financial and socioeconomic conditions. Substantial initial investment costs for SHS, ongoing operational expenses, a lack of necessary infrastructure, limited education and awareness, limited economic opportunities, and the influence of social and cultural factors all contribute to the difficulties faced in bringing these systems to fruition," he said.

The analysis also showed that the classification of households based on socioeconomic status exacerbates the issue, impeding many from accessing the support they need and resulting in the slow adoption of SHS. "For this reason, only a few households are benefiting from these subsidies, leading to those not receiving the subsidies to boycott electricity and resort to illegal and informal ways of connecting to the electricity grid and other unstable sources of fuels like wood, charcoal, and paraffin especially in informal settlements and in backyard dwellings. Moreover, these indigent energy policies and city officials still overlook the presence of household 'hustling' survival and coping strategies such as engaging in informal economic activities to generate income for livelihood earnings," said Masuku.

Masuku concluded that the severity of energy poverty at the household level in South Africa requires relevant energy poverty alleviation policies that should pay more attention to the most energy-deprived households to eliminate extreme poverty. "Moreover, since the affordability and reliability of energy services are important indicators in energy poverty measurement, it is imperative to incorporate our household required energy (affordability

concept) into a multidimensional measure to examine other deprivations of energy services/consumption."

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Issued by: UCT Communication and Marketing Department

Ridovhona Mbulaheni
Media Liaison and Monitoring Officer
Communication and Marketing Department
University of Cape Town
Rondebosch
Tel: (021) 650 2333
Cell: (064) 905 3807
Email: ridovhona.mbulaheni@uct.ac.za
Website: www.uct.ac.za