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Tanzania enjoys abundant renewable energy resources, but has exploited only a few of them. Its recent rapid socioeconomic development requires a shift from biomass-dependent energy structure to a more sustainable one. International energy agencies provide optimistic projections of its renewables potential.



Mini-grid on Ukara Island, Lake Victoria, Tanzania

RENEWABLE ENERGY IN TANZANIA

BACKGROUND

Tanzania has been recognized as one of the least developed countries in the world. As of 2016, the per capita GDP in Tanzania was \$2,787 (PPP), 17.2% of the global average and more than 25% lower than the average of sub-Saharan Africa. However, this country is experiencing steady socioeconomic growth as its **GDP has increased by more than 150% compared to 2006** levels and the country has experienced nearly 40% population growth. The economic expansion is largely credited to progress in agriculture and infrastructure construction. As of 2014, the electrification rate in Tanzania was less than **one sixth of its total population** and a mere **4% in rural areas**.

ENERGY MIX AND RENEWABLE POTENTIAL

Tanzania's present energy mix is comprised of biofuels and waste, oil, gas, coal, and some renewables. As of 2015, biomass dominated Tanzania's total primary energy supply. 80% of its supply comes from biomass; 12% from oil; 3% natural gas; less than 1% from coal; and a minimal portion of renewable energy, primarily in the form of hydro power. Electricity generation from hydro power accounts for 2,108 GWh in 2015 and solar 21 GWh, a negligible amount compared to almost one million GWh electricity provided by burning wastes.

Tanzania is a country endowed with diverse forms of renewable resources, ranging from hydro and geothermal to solar, wind and tidal waves. Unfortunately, its heavy dependence on traditional fuels has encumbered its road to a greener energy consumption pattern. Considering the huge potential of Tanzania's renewable resources, it is estimated that much of Tanzanian oil-based power can be **displaced by wind power at a third of the cost**, and utility-scale **solar PV and wind** projects are capable of generating **3.7 GW and 1.9 GW power by 2030**. IRENA provides a very ambitious projection for Tanzania that 78% of its electricity production will come from renewable resources by 2030.

TANZANIA'S RENEWABLE ENERGY STRATEGY

Recognizing the problem, Tanzania has issued a couple of policies and regulations to forward its long-term sustainable development. According to the Tanzanian government's Development Vision (TDV) 2025, Tanzania will strive for becoming a middle-income country by 2025. Under the TDV 2025, the Government of Tanzania

has embarked on reforming the electricity supply industry with a regulatory document, *Reform Strategy and Roadmap 2014-2025*. According to this RSR document, national electrification rate will increase to at least 50% by 2025, and renewable energy means, including wind, solar, geothermal, will embrace its debut in Tanzania's energy mix. However, the projected combined capacity of these renewables, except hydro power, will be 500 MW, only 4% of its total capacity. The later Electricity Systems Operations Act 2016 gives priority for dispatch to the electricity generated from renewable energy resources and indigenous resources. However, a specific guideline remains uncertain.

INTERNATIONAL COOPERATION

In 2017, Tanzania and Lighting Africa co-announced a new campaign to promote solar lighting and energy in off-grid rural Tanzania. As part of the World Bank Group's contribution to Sustainable Energy for All (SE4ALL) initiative, Lighting Africa conducted a series of work promoting renewable energy use in Tanzania and aims at enabling access to cleaner and safer off-grid lighting and energy for 6.5 million people by 2019. The World Bank Group has long been an important donor to Tanzania and it has funded several renewable projects since 2008. Other major financing sources in this field include AFDB, DFID, Sweden, and European Union.

BARRIERS AND POLICY RECOMMENDATIONS

Tanzania's rapid economic development, steady population growth, and government endeavor to diversify its revenue source from dependence on agriculture combine challenge Tanzania's current biomass-led energy structure. Renewable energy should be given more importance and developed from zero to many. As noted in previous sections, outlooks for Tanzania renewable energy vary significantly from international energy agencies to the Tanzanian government. In this sense, it is recommended that Tanzanian policymakers need to make a comprehensive and in-depth study on renewables potential, especially on financial and climate benefits. Based on these studies, a more accurate renewable energy policy scenario analysis can be conducted. Furthermore, a renewable energy research center and more educational programs in universities should be taken into consideration. To fully vitalize renewable energy industry in Tanzania, there will be a long road ahead. First of all, a renewable-oriented guideline should be published. A more ambitious target, along with specific approaches to achieve it, should be articulated. Second, financial incentives should be provided. A set of favorable tariff and tax policies can help to attract foreign and private investment in renewable energy industry, especially when it comes to relative costly up-front investment. Meanwhile, a framework should be established to facilitate coordination among financial institutions and private investors. For end-uses, we recommend Tanzania to introduce net metering to encourage the use and production of renewable energies.

KEY SOLUTIONS

1. *Conduct in-depth research on the potential of renewable energies*
2. *Analyze new policy scenarios*
3. *Establish a national research center*
4. *Publish specific guidelines*
5. *Introduce favorable tariff and tax regulations*
6. *Facilitate and coordinate various financial resources*
7. *Introduce net metering*



**Initiative for
Sustainable Energy Policy**

Energy, Resources and Environment

Rome Building, 4th Floor

1619 Massachusetts Ave, NW

sais-isep@jhu.edu

[@sais_isep](https://twitter.com/sais_isep)

www.sais-isep.org

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Hosted at the Johns Hopkins School of Advanced International Studies (SAIS), the Initiative for Sustainable Energy Policy (ISEP) uses social and behavioral science to design, test, and implement sustainable energy policies in emerging economies. ISEP identifies opportunities for policy reforms that allow emerging economies to achieve human development at minimal economic and environmental costs. The initiative pursues such opportunities both pro-actively, with continuous policy innovation and bold ideas, and by responding to policymakers' demands and needs in sustained engagement and dialogue.

