

The Role of Renewable Energy on Industrialized Economy in Tanzania: Sustainable Development, Livelihood, And Poverty Reduction Perspective

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Summary

At present, renewable energy development is emphasized for sustainable development goals accomplishment and the better realization of sustainable development globally. Tanzania, like other developing countries, is striving to adopt different ways of ensuring affordable and accessible energy supply to its socioeconomic and political sectors. Renewable energy resources if fully developed and utilized can be a veritable tool for poverty reduction and sustainable development in Tanzania. Poverty reduction is undoubtedly one of the highest ranking issues in the policy strategy of the Tanzania government. This policy brief explores the potentiality of renewable resource for poverty reduction and sustainable development attainment in Tanzania. It recommends that, the government must have a stand-alone renewable energy policy, harness the potentials of renewable energy resources that are abundant in various geographical zones of the country, complement existing policies and strategies to address issues related to renewable energy, enhance entrepreneurship and managerial skills development training programme, and provide a sound business and investment environment to local and foreign. The policy brief concludes that, given due consideration to both the technical, political and economic viability of its application, renewable energy can be utilized to meet the challenges posed by the present energy demand and climate change impacts.

Introduction

Energy security is a socio-economic and political factor that contributes to sustainable development (SD) in any nation. Access to reliable, affordable, sustainable, and modern energy to all people is one of the sustainable development goals (SDGs). The use of non-renewable energy is considered the principal provider to climate change, which is about 60% of the total greenhouse gas emissions; therefore, decrease of carbon concentration is a key goal in long-term climate objectives. To ensure sufficient, efficient, environmentally friendly, and sustainable energy supply, the use of renewable energy resources is the best option for substituting non-renewable energy use. Globally, renewable energy resources entail hydropower, solar, wind, wave, geothermal power, waste energy such as gases from landfills, incineration, biomass, and liquid biofuels. Notwithstanding its significance, renewable energy still embodies only a low ratio of the current global energy production, supply, and consumption. In Tanzania, major sources of power are natural gas, petroleum, and hydropower. A report by USAID on Power Africa in Tanzania reported that out of the total installed power capacity of 1,264 megawatts (MW), 568 MW is from hydroelectric power, 685.4 MW is from thermal power, and other renewable energy contributes less than 82.4 MW. More than 85% of the population uses traditional fuels as household energy sources. According to Bureau of Statistics and the Rural Energy Agency

report, only 32.8% of communities in Tanzania has access to electricity, whereby urban areas have more access to electricity (65.3%) than the rural areas (16.9%). Further the minister of energy report on energy status indicated that, out of the total electrified households, 74.9% and 24.7% are electrified with national grid and solar power, respectively. The rest (0.3%) are electrified with individual electricity produced from other sources such as small generators. Tanzania has a lot of renewable energy sources such as biomass, solar, hydropower, geothermal, biogas, wind, tidal, and waves. These sources are important for decentralized renewable energy technologies, which nurture the isolated nature of the settlements and are environmental friendly. Despite their necessity, renewable energy sources are given low priority by both government and households. They are important to users in local households in the countryside, where most people depend on the use of charcoal, firewood, and cow dung as their major sources of energy. This affects their health and contributes to climate change problems, which are alarming in developing countries.

RE and Poverty Alleviation

Poverty is the most crucial problem facing developing countries because of its effect on livelihoods. Energy services are paramount to the basic development challenge of providing adequate food, shelter, clothing,

water, sanitation, medical care, schooling, and access to information. Although energy is one dimension or determinant of poverty and development, it is very vital. Energy supports the provision of basic needs such as cooked food, a comfortable living temperature, lighting, the use of appliances, piped water or sewerage, essential health care (refrigerated vaccines, emergency and intensive care), educational aids, communication (radio, television, electronic mail, the world wide web) and transport. Energy also fuels productive activities including agriculture, commerce, manufacturing, industry and mining. Conversely, lack of access to energy contributes to poverty and deprivation and can contribute to economic decline. In Tanzania, the desire to increase the access and use of RE is a must for the sake of poverty reduction and livelihood improvement.

RE and Income Growth

Energy consumption shows a strong correlation with national income, so that countries with higher income are also those with higher energy consumption. Economic growth creates employment and raises incomes. Essentially, most economic activity would not be possible without energy as a critical input, and these include the small and medium-scale enterprises (SMEs) that constitute the primary source of new jobs for the poor. Hence, the type of economic growth that creates jobs and raises incomes depends on greater and more efficient use of energy.

RE and Agriculture

At the local level, energy facilitates agriculture development by improving productivity and enabling local income generation through improved irrigation, crop and product processing, storage and transport to market.

RE and Education

RE energy services enhance the delivery of key social services. For example:

- In homes, electricity helps to improve children's educational attainment, even where its use is limited to a single light bulb;
- RE for pumping and treating raw water makes it possible to provide clean water in schools
- RE services frees time for productive ventures, education, and leisure-time that would otherwise be spent collecting traditional fuels or in much less productive manual labor.

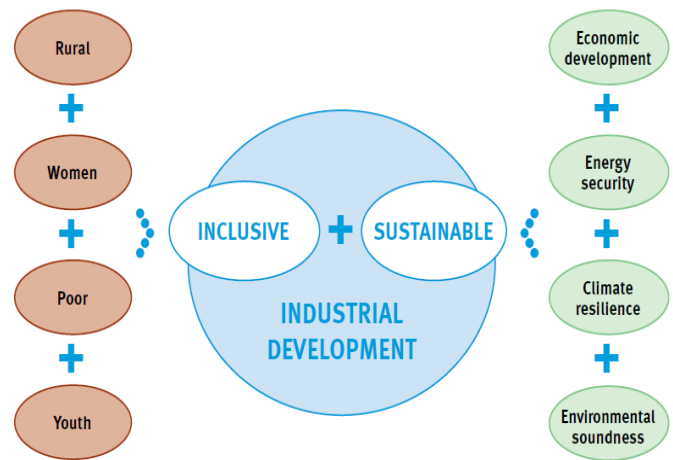


Figure 1: Dimensions of Inclusive and Sustainable Development (Masera and Faaija, 2014)

RE and Gender Equality

Health access, education attainment, and productive activities of women and children are very sensitive to the availability of RE services. Improved cooking fuels free women and children from the burden of collecting and carrying large bundles of firewood over long distances and from exposure to harmful fumes from primitive cooking stoves. Improved lighting makes it possible for adults and children to relax and have entertainment after the end of their daytime activities; it also provides a better learning atmosphere for children beyond the hours of sunset. Moreover, electricity enables both women and men in poor households to engage in activities that generate income—by providing lighting that extends the workday and powering machines that increase output beyond subsistence levels. The lack of modern fuels and electricity also reinforces gender inequalities. Many of the poorest households are headed by women — due mainly to the loss of a male bread winner. Women and girls who are responsible for fuel gathering and cooking are in such situation disproportionately burdened by lack of access to modern fuels and electricity. In addition to the time spent gathering fuels, most traditional staple foods involve a large amount of threshing, de-husking or grinding, which is mostly done through female labour in the poorest households and regions due to lack of access to mechanical power. Many girls are withdrawn from school to attend to such domestic chores, which have significant negative effects on their educational and economic chances. Energy services such as heat for cooking and power for food processing are, therefore, particularly important for women and girls.

RE and Health

The conservation of medicines in remote rural areas where medical services are relatively weak could be improved by an affordable access to clean energy. RE makes it possible to refrigerate vaccines, operate medical equipment, and provide Lighting after sunset in

health clinics. Further, the conservation of medicinal trees could have enhanced through a shift to RE.

RE and Environment Sustainability

Energy services are essential ingredients of all three pillars of sustainable development — economic, social and environmental. And economies that have replaced human and animal labor with more convenient and efficient sources of energy and technology are also the ones that have grown the fastest. Many energy sources are drawn directly from the environment, requiring sound management for these sources to be sustainable. The poorest people often live in the most ecologically sensitive and vulnerable physical locations. The risks facing poor people are often increased by the unsustainable use of biomass resources by themselves or others — although more often by the latter group who exploit these resources for commercial purposes. Use of RE resources combined with cleaner technologies, can help reduce the environmental effects of energy use and help Tanzania grow their economies while also replacing existing, inefficient polluting fossil fuel technologies that pollute the environment. Much as this may seem enticing, the issue of affordability particularly in respect of the poor cannot be taken for granted. As a complementary measure, careful management and consideration of RE is important to promote economic growth, protect ecosystems and provide sustainable natural resources.

RE and Industrialized Economy

Every country's economy can be described as an integrated energy system that consists of streams of energy-producing and energy-using activities. Energy is central to practically all aspects of sustainable development. Energy is central to the economy because it drives all economic activities. All economic activities and processes require some form of energy. Energy thus plays a critical role in social and economic transformation. Lack of access to energy places severe constraints on national development resulting in sub-optimal outcomes where poor people are often the greatest losers. Reliable, efficient and competitively priced energy supplies also attract foreign direct investment — a very important factor in boosting economic growth in recent times. Human progress is driven by energy and the world needs to make sure that the benefit of modern energy services is more sustainable than ever before. The global economy is facing a huge challenge by the transition to a sustainable energy system though we have the opportunity to reconsider our energy models and RE has a significant role to play in this defy. Improved RE has the following significances:

1. Contribute to creating new product and service opportunities.
2. Improve the efficiency and viability of existing activities.
3. Reduce the opportunity costs associated with ineffective forms of energy.

RE services will also save households significant sums of money which can be invested into other development needs.

Challenges of Renewable Energy Development in Tanzania

- i. **Shortage of Human Resource and Training**-Skilled workforce to initiate, operate, and maintain renewable energy projects is a necessary tool towards successful implementation of RE projects
- ii. **High Initial Investment Cost**-Initial investment is a unique and essential tool for RE project development as it enhances investor's confidence and reduces the financial gap
- iii. **Poor Community Awareness and Information Flow**- A lot of people have an insufficient understanding of RE technologies.
- iv. **Lack of incorporating RE issue on policy, strategies and plans**-issues of RE are rarely incorporated into national, district or local policy, strategies and development plans.
- v. **Low Level of Research and Development**- there is no visible plan being offered to academic institutions concerning renewable energy research works. There are no local or regional research centers that can provide basic research amenities and infrastructures for renewable energy technologies.
- vi. **Poor and Unfriendly Institutional Framework**- The institutional structure of the energy sector is still under a central government monopoly, with the responsibility for energy generation and supply lying with local government institutions and other independent departments.
- vii. **Electricity Networks Unreliability**- there is a need to adopt decentralized energy systems that can efficiently and effectively support renewable energy technologies.

Globally, the assurance of RE benefits to the community is now needed more than ever. The obligation to offer economic development and energy access to the global population and in the context of the current climate crisis, to follow the concept of a sustainable industrialization, the need for a clear, stable and predictable energy policy (that focuses on a low-carbon RE, and the best use of local resources) is highly needed. In achieving the Sustainable Development Goals(SDGs), RE as an alternative for fossil fuels provides various benefits and contributes to the industry and industrial development as summarized below:

1. Industries have the potential to produce RE on site which will allow communities to use energy as an extra income opportunity.
2. The overall environmental impact of industries will be reduced.
3. Local green jobs will be created.
4. The establishment of 'green industries' will be enhanced.
5. Built-up of RE components through the insertion of RE in the utility industry
6. Providing sustainable energy access as a result of increasing local productive activities.

7. Encouraging the use of RE for industrial application.
8. Creation of national economy through value addition to national natural resources and reducing importing sources of energy.

Recommendations

- There should be more training and awareness made available to the public about how to invest and use of RE
- A separate RE Policy has to be prioritized
- Government at all levels should make adequate provision for research grants in RE resources to make production cheaper and generation more efficient.
- A comprehensive resource survey and assessment be carried out to determine the total RE potential in the country as well as identify local conditions and priorities in various ecological zones.
- The government, along with other renewable energy stakeholders, should complement existing policies and strategies to address issues related to renewable energy development to ensure timely and sustainable utilization of the available resources.
- The development of renewable energy technologies is linked to many other sectors such as agriculture, small scale industrial enterprises and poverty alleviation, it is recommended that, renewable energy related projects have a greater likelihood of success if implemented in accordance with activities in these sectors to ensure sufficient demand for the energy services providers.
- Demonstration projects on various renewable energy forms be widely established; so that the performance and

efficiency with which services are delivered can be sensitized

- Entrepreneurship and managerial skills development training programme and technical courses in renewable energy technologies with a view of creating self-employment and developing Energy Service Companies (ESCOs), providing services to rural areas be introduced.
- There is the need to provide a sound business and investment environment to local and foreign people who can provide capital towards renewable energy technologies and development.

Conclusion

Renewable energy resources if fully developed and utilized can be a veritable tool for poverty reduction and sustainable development in Tanzania. Further, it offers an immediate means to decarbonise the global energy mix. Poverty reduction is undoubtedly one of the highest ranking issues in the policy strategy of the Tanzania government. For this objective to be actualized, government must harness the potentials of renewable energy resources that are abundant in various geographical zones of the country. Given due consideration to both the technical, political and economic viability of its application, renewable energy can be utilized to meet the challenges posed by the present energy demand and climate change impacts. Therefore, measures must be taken by the government at all levels to make adequate policies in effective exploitation, management and utilization of our renewable energy resources in order to reduce dependence on fossil fuel. This will go a long way in providing opportunities for the less privileged and result in income generation and improved standard of living.

For Further Reading

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