

# The Role of Energy in Economic Transformation

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## Abstract:

Many countries, especially in Africa are still having challenges with regards to their energy demand. Botswana, like the rest of them is not immune to these challenges. Owing to the fact that country is unable to meet its current energy demand, although it has abundant coal reserves, and one of the highest solar irradiations in the world, there is a burning need to address this as energy is one of the key drivers for any economy to thrive. In its economic transformation agenda drive, the role of the energy sector presents an opportunity for Botswana to move towards not only being self reliant and self sufficient but also become the net exporter of energy. Hence, the need to tap into all sources of energy for the benefit of the country and find more sustainable means to transforming the economy through the energy sector. The energy sectors however, has an undoubtedly large environmental footprint. Energy production accounts for about 71 percent of global green house gas emissions and therefore, any attempt to address issues of climate change in the energy sector, there must be a full transformation of how energy is supplied and consumed and innovation is central to this transformation.

**Keywords:** Economics and energy sustainability, Economic transformation

## Introduction and background

Economic transformation is a long term and continuous process of shifting labour and other resources from lower to higher-productivity activities both within and between sectors. This shift facilitates aggregate labour productivity growth over a sustained period and result in more diversified and complex productive

activities (Booth, D., and Velde, D, 2019). The role of the energy sector in economic transformation cannot be overemphasized. This is because the energy industry significantly influences the vibrancy and sustainability of the entire economy, from job creation to resource efficiency and the environment (Yergin, D. et, al., 2012).

It is without a doubt that the energy sectors is one of the sectors that is experiencing a rapid increase in demand. More countries especially developed countries are even moving towards what is referred to as green growth in the energy sector. Green growth can be defined as economic progress that fosters environmentally sustainable, low carbon and social inclusive development UNEP (2018). It is economic growth that goes beyond economic output but is more inclined towards the quality of growth, respecting the earth's carrying capacity and sustainable use of natural resources.

There are a number of technologies that have been on the rise in order to help transform the energy sector. These include adopting of renewables, end use energy efficiency measures where less energy is used to generate the same level of output (examples include weather stripping buildings or adopting green building principles), end use fuel switching. (UNEP, 2018).

When talking about transforming the energy sector, the two main focus areas are reduction of GHGs emissions and investments in the sector. According to the IEA, (2011) GHGs emissions ought to be reduced by 1.5 percent by the year 2050. This will require a large deployment of technologies. In terms of costs, the OECD states that an additional cumulative investment of USD 46 trillion is needed to transform the energy sector by 2050. This is an additional investment on top of what is already been done to transform the sector.

OECD (2011) suggests that the key elements of green growth in the energy sector include energy innovation, energy integration, energy implementation and energy transformation. Energy innovation involves diversifying the energy sector needs by use of innovative means i.e producing energy from waste to make gas. Energy integration ensures the efficient integration of multiple technologies in energy production. This involves the integration of multiple storage technologies, infrastructure, electronics etc in order to draw energy from where it is available to where it is needed (OECD, 2011).

However, some of the key challenges that the global economy is faced with in their pursuit of greening the energy sector include large upfront capital. Financing is often a huge challenge in many less developing countries. Green energy often need to be integrated into the grid, and the grid integration and transmission often requires additional costs for transmission. Similarly, as it is the case in many developing countries, where the use of non renewable or traditional sources of energy supply is dominant, unpriced costs of traditional energy such as emissions makes it harder for greener technologies and energy efficient alternatives to compete. Consequently, new technologies requires a shift on how people behave or perceive the energy problem.

The paper intends to establish the role of energy sector on Botswana's transformation agenda. It is without a doubt that the sector plays a critical role in driving many other sectors in the economy, therefore, a deliberate action towards transforming the sector as well ensuring the country has good standing on its energy security will go a long way. The paper will use desktop review to gather existing literature on the subject matter.

## Materials and methods

The study adopted qualitative data collection approach which primarily include desktop reviews and in-depth interviews with key stakeholders in the energy sector in Botswana.

### *In-Depth Interviews*

In-depth interviews were conducted with relevant stakeholders in the energy sector in Botswana. The interviews gathered information on the economic transformation in Botswana and the role the energy sector plays. In-depth interviews were conducted with eight key players in the energy sector namely: Botswana Power Corporation, The Ministry of Minerals, Green Technology and Energy Resources, Department of Energy, Botswana Energy Regulatory Authority, Department of Meteorology, Independent Power Producers, Ministry of Environment, Natural Resource Conservation and Tourism, Ministry of Local Government and Rural Development. The interviews were administered through an interview guide.

### *Desktop reviews*

This involved the collection of secondary data through a review of studies undertaken in the renewable energy sector in general and Botswana in particular. The review also included a review of policies and regulatory framework within which the renewable energy sector operates. The literature review also included government publications, reports, and strategy documents.

The analysis on the policy and regulatory assessment were drawn partly from the following non exhaustive policy/strategy documents and legal instruments.

- The National Development Plans
- Vision 2036
- Draft Energy Policy
- Botswana Energy Masterplans
- Botswana Biomass Strategy

## Results and discussion

### *Global investment in renewable energy*

Over the last decade, research shows that the energy sector has been experiencing major transformation. Many economies have intentionally put more effort towards moving from the use of fossil fuels as their main energy source and moved towards incorporating renewable energy in their energy mix. Global investments in renewable energy has also been on the rise. UNEP (2019) reports that global investment in renewable energy stood at \$213 billion in 2013, \$265 billion in 2014 and \$302 billion in 2015. Although we evidenced slight decrease in 2016, 2017 recorded total investment of \$309 billion while 2018 recorded \$273 billion.

A closer look in the sector which indicates that renewables attract more investment, depicted that solar and wind energy are the leading sources of renewable energy in terms of investment. About \$1349 billion was invested in solar energy over the last decade (2010-2019) while \$1023 billion was spent on wind energy (UNEP, 2019). The least investments went into geothermal energy which stood at \$ 19.8 billion.

In terms of the renewable energy investment by regions, research showed that Asia is the leading region on renewable energy investment on wind and solar energy, followed by Europe and North America. Africa is still however lagging behind in terms of investments in renewable energy having evidenced a larger proportion of fossil fuels in their energy mix. With regards to costs of renewable energy, studies indicate that the cost of renewable energy have been declining over the years. Cost in solar PV decreased by 82 percent between 2010 and 2019, while we evidenced a decrease of 47 percent on concentrating solar power (CSP), a 39 percent decline in onshore wind energy and 29 percent decline in offshore wind energy (IRENA, 2019).

Of particular interest is that even though there is a global increase in investment on renewable energy, fossil fuels investment however still dominate the global total energy investment unfortunately. For the energy sector to fully transform, we need a more deliberate effort to channel more funds in renewables, especially considering the fact that they equally reduce green house gas (GHGs) emissions, one of the key sustainable development goals (SDGs).

### *Energy and economic transformation in Botswana*

It is without a doubt the role the energy sector plays in driving all other sectors in the economy. The need for government intervention on energy matters is often justified by existing barriers and positive externalities that come with transforming the energy sector. Even though there are deliberate efforts to green the energy sector, the global investments in energy supply is still dominated by fossil fuels coupled with a lot of subsidies on fossil fuel energy production (IRENA,2019).

As already mentioned in the preceding chapter, a key factor in transforming the energy sector is through investments and innovation. In order for the world to move towards achieving SDGs on reduction of GHGs emissions and achieve energy security, more investments ought to be put up in diversifying sources of energy supply of which renewable energy is part.

Botswana's 2020/2021-2022/2023 economic recovery and transformative plan on energy and climate change, often termed as "greening the recovery", acknowledges the need to move towards a greener form of energy production and consumption. This is at the back of the country's continued efforts to reduce the impacts of global warming and reduce CO<sub>2</sub> emissions. The agenda therefore emphasizes the need to move towards solar generation, reducing subsidies to the use of fossil fuels and introducing carbon taxes (MFED,2020).

In their quest to ensure economic transformation and the appetite to green the energy sector, the government can also introduce a number of reforms. These include putting up measures that will ensure there are no barriers to energy production. Direct investments in energy production is one, where government shifts their budget to give the sector enough allocation to carry out necessary projects for energy production, fiscal measures such as tax credits or tax relief for companies that are directly in the production of energy, financial support to independent power producers (IPPs) or any other entity that is involved in energy

production, information and education, sensitizing the public on energy matters and energy efficiency. Government can also offer support in a form of creating parastatals that directly deal with strategic planning on energy matters, setting up energy goals for the country etc. Furthermore, the feed in tariff measures where government gets into fixed terms contracts with suppliers of energy at an above market rate are measures that would incentivize more players to come into energy production (Azhgaliyeva, 2019). The regulatory framework is also of utmost importance. These include energy auditing entities, monitoring and evaluation entities, and those that ensure the country abides by the world code of conduct and standards on energy matters. Finally, allocation for budgets for research and development either by government or parastatals. All these will ensure the country moves towards becoming not only energy secure but will increase efforts by Botswana to eventually become the net exporter of electricity.

Transformation in the energy sector is pertinent, especially that the sector drives many more sectors of the economy. For Botswana to achieve economic transformation, transformation in the energy sector is very important and deliberate efforts ought to be implemented to ensure sustainability which will eventually move the country to its envisaged high income status.

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