

# The investigation of the impacts of optimized energy policy and energy business models on large-scale urban programs in developing countries.

Ifeoluwa Garba, Richard Bellingham

CDT Wind Energy Systems, Rm 3.36, Royal College Building  
University of Strathclyde, 204 George Street, Glasgow, G1 1XW

ife.garba@strath.ac.uk

## Abstract

In developing countries, due to the total lack of access to energy systems in some regions or its availability to only high income households in the society, amenities deemed basic in developed countries, such as reliable and resilient energy systems, can in fact be classed as luxurious attributes [1].

The impact of the lack of access to modern energy systems, not only attributes to the poor quality of life experienced in these countries but also plays a vital role in health and environmental issues, whilst causing severe hindrance to the social and economic developments in these countries.

Consequently, the aim of this research is to develop optimised energy policies and business models to facilitate the alleviation of energy poverty whilst concurrently aiding large-scale urban developments in these countries.

## Economy:

Due to the lack of reliable energy in most developing countries, it is anticipated that potential economic activities that could promote the development of these countries are heavily impacted and curtailed. For example, in Nigeria, due to the country's ongoing energy crisis, it is reported that agricultural, manufacturing and transportation activities in the country are severely impacted. As a result, the standard of living in Nigeria has been reported to have drastically increased, with commodity prices increasing by up to 250% [3].

Several literatures have extensively studied the effect of energy on a country's economy, it is strongly believed that the inputs and outputs of various sectors of the economy all rely on the availability of energy [1]. Consequently, it becomes evident that to aid development of countries, achieve the set millennial goals and to eradicate poverty, energy policies must be optimised.

## Background and introduction

Alongside South Asia, Sub-Saharan Africa has the largest number of people relying on traditional solid fuels for energy generation such as cooking and heating.

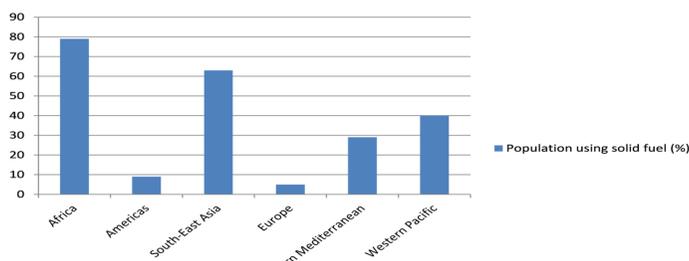


Figure 1. Percentage of the population relying on solid fuel [2].

The following issues are some of the observed impacts of the reliance on traditional solid fuels:

## Health:

The combustion of fuel sources such as coal and unprocessed biomass indoors leads to household indoor pollution. This has been connected to respiratory diseases such as Acute lower respiratory disease (ALRI), Lung cancer as well as diseases such as stroke, Ischaemic Heart Disease (IHD), amongst others. Consequently, all these result in the high death rates observed in these regions. Figure 2 illustrates the mortality rates attributable to indoor pollution.

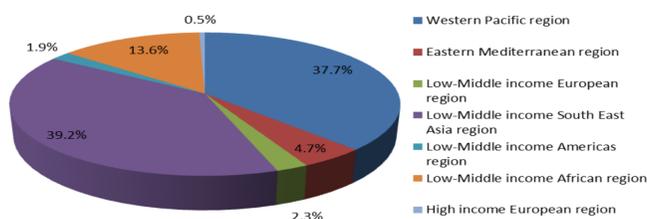


Figure 2. Percentage of the deaths caused by indoor pollution [2].

## Environment:

Various environmental impacts are associated with the use of solid fuel. An example is Kenya, where coal being the principle household fuel, has led to severe environmental degradations due to the amassing of the fuel. In countries where wood serves as the primary fuel source, environmental issues due to deforestation have also been reported. These degradations are also anticipated to have significant prejudicial impacts on biodiversity due to habitat degradations or in some cases, destruction.

Alongside the impacts on biodiversity, there are also visual impacts as well as pollutant emission issues that arise from the combustion of these solid fuels. Some of these pollutants result in the greenhouse gases which are contributing to climate issues.

## Research questions

The problem statement for this PhD is:

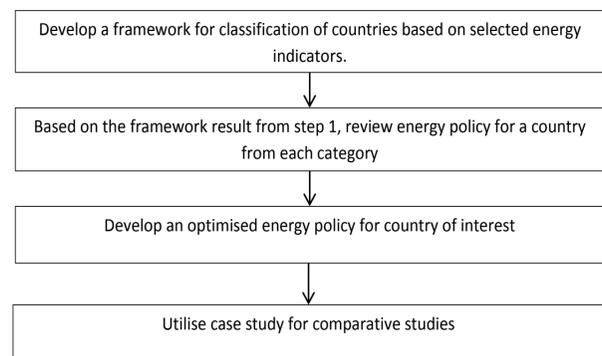
“How can optimised energy policy impact the development of developing countries?”

To answer this question, the following secondary questions amongst others, need to be answered:

- How can we universally define energy poverty?
- What indicators must be considered in defining energy poverty?
- How can we classify countries based on energy poverty levels?
- What are the direct and indirect impacts of the lack of and/or ineffective energy policies in these deprived countries?
- What aspects of the existing policies need optimising?

## Proposed approach

The intended approach for this work is as follows:



## Conclusion

The need for optimised energy policies which promote improved access, affordability, reliability and security of energy is becoming more crucial: especially in developing countries.

As a result, this work aims to provide a universal definition for energy poverty, develop a framework for classifying countries based on energy poverty levels and design optimised energy policies for some of the most deprived countries. The aim is to promote development and alleviate poverty in these countries.

## References

- [1] African Development Bank, "Energy sector policy of the AfDB group," African development bank group, Tech. Rep., 2013. [Online]. Available: [http://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/Energy\\_Sector\\_Policy\\_of\\_the\\_AfDB\\_Group.pdf](http://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/Energy_Sector_Policy_of_the_AfDB_Group.pdf)
- [2] World Health Organization, "Household air pollution burden of disease by country, 2012," 2012. [Online]. Available: <http://apps.who.int/gho/data/node.main.HAPBYCAUSEBYCOUNTRY?lang=en>
- [3] Oyedepo, Sunday Olayinka. "Energy in Perspective of Sustainable Development in Nigeria." Sustainable Energy 1, no. 2 (2013): 14-25.