

# The Relevance of Green Energy Projects in The Developing Countries

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## Abstract

Today, renewable energy<sup>1</sup> sources are a key pillar to achieving sustainable development, which is the main reason why energy projects are being carried out not only in developed countries but also in many emerging countries. The sustainable development of energy systems is increasingly important for politicians and decision makers' worldwide. Energy fuels economic growth and is therefore of paramount concern for all countries. no country has been able to substantially reduce poverty without significantly increasing its use of energy, replacing human and animal labour with more efficient forms of energy. The paper explores the relevance of green energy projects in the developing countries. It discusses achieving United Nations Sustainable Development Goal (SDG) 7 - affordable and clean energy. It discovered that energy use in developing countries is closely linked to a range of social issues: poverty alleviation, education, health, population growth, employment, enterprise, communication, urbanization and a lack of opportunities for women. The study showed that the renewable energies have the potential of offering universal access to affordable, reliable and modern energy services; addressing development and environmental challenges; and increasing security and economic stability. Examples were provided and case studies of countries that have applied renewable energies projects given, offering best practices scenarios. The contribution of project management as a field was evident in implementation of the

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<sup>1</sup> Renewable Energy (RE) refers to clean electricity generation through hydropower, wind power, solar energy, biomass (waste to energy), geothermal energy and biofuel.

various renewable energy sources projects. These contribute to the global energy demand and offer sustainable solutions to long-term wealth creation, employment and new business opportunities, hence building business resilience and sustainability by providing energy solutions in both the public and private sector.

**Keywords:** Renewable energy, sustainable development, green energy projects, developing countries,

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## 1.0 Introduction

Green energy refers to energy from renewable sources i.e., for an energy source to be green, it must be renewable. It is therefore clean energy<sup>2</sup> and includes green electricity. Green energy is produced with little-to-no environmental impact and does not disperse greenhouse gases<sup>3</sup> into the air that contribute to global warming, the way fossil fuels do.

In the words of Anders W. (2007), the role of energy in development is crucial. Energy fuels economic growth and is therefore of paramount concern for all countries. An estimated two billion people in the world lack access to modern energy carriers. As long as they have to rely on fuel wood and animal dung for their energy needs there will be no development. In fact, no country has been able to substantially reduce poverty without significantly increasing its use of energy, replacing human and animal labour with more efficient forms of energy.

This discussion relates to the United Nations Sustainable Development Goal (SDG) 7 on affordable and clean energy.

Universal access to energy, increased energy efficiency and expanded use of renewable energy by 2030 will result in

- enhanced economic opportunities and jobs,
- empowerment of women and youth,
- better education and health, and
- more sustainable, equitable and inclusive communities.

Access to clean energy would boost protection from and resilience to climate change (UN, 2018).



Achieving SDG 7 will benefit billions of people all over the world.

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<sup>2</sup> Clean energy is produced through means that do not release greenhouse gases or any other pollutants to the environment.

<sup>3</sup> a gas that contributes to the greenhouse effect by absorbing infrared radiation. Carbon dioxide and chlorofluorocarbons are examples of greenhouse gases.

## 1.1 Background

According to the United Nations, the world is making progress toward SDG goal 7, with encouraging signs that energy is becoming more sustainable and widely available. Access to electricity in poorer countries has begun to accelerate, energy efficiency continues to improve, and renewable energy is making impressive gains in the electricity sector. Nevertheless, more focused attention is needed to improve access to clean and safe cooking fuels and technologies for 3 billion people, to expand the use of renewable energy beyond the electricity sector, and to increase electrification in sub-Saharan Africa.

The case of Kenya is quite evident in the steps taken to progress SDG goal 7. As of April 2017, the Kenyan Government had increased power production by 696 MW from 1,765 MW in 2013 to 2,461 MW. In the same period, the government decommissioned over 130 MW of expensive emergency diesel power, leaving a total of 2,333 MW of installed capacity. This is a 32% increase in power generation, of which, well over half is attributed to the increase in renewable energy production. The new power generation plants are largely from renewable energy sources; geothermal, wind power and hydro. As a result, renewable energy now accounts for over 70% of Kenya's installed capacity compared to the world average of 24%. The government has new renewable energy power plants under development including the 300 MW Lake Turkana Wind Power Plant, which is the single largest wind power plant in Africa, 70 MW Olkaria 1 (Unit 6) and the 140 MW Ol Karia V. Power generation has enabled the Government:

- to increase power connectivity to households (from 12.8 million Kenyans in 2013 to 34.1 million Kenyans in June 2017, a 170% increase) and for industrial use across the country.
- led to reduced cost of power production and distribution resulting in a competitive edge in the manufacturing of products as well as stable, adequate and reliable power across the country- especially during the cyclic drought periods.
- led to the creation of employment opportunities, increased social economic development and boosted the ease of doing business in Kenya.

The current facts and figures as given by the United Nations on SDG goal 7 is that, 13 percent of the global population still lack access to modern electricity, while 3 billion people rely on wood, coal, charcoal or animal waste for cooking and heating. Energy is the dominant contributor to climate change, accounting for 60 percent of total global greenhouse gas emissions. In 2016, the share of renewables increased at the fastest rate since 2012, up 0.24 percentage points and reached almost 17.5 percent owing to rapid growth in hydropower, wind and solar.

The SDG goal 7 targets as established by the United Nations are:

- a) By 2030, to ensure universal access to affordable, reliable and modern energy services
- b) By 2030, increase substantially the share of renewable energy in the global energy mix

- c) By 2030, double the global rate of improvement in energy efficiency
- d) By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.
- e) By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support.

Strides are therefore being made by most developing countries in progressing access to affordable and clean energy due to the relevance and benefits associated with achieving this sustainable development goal as outlined by the United Nations.

## 2.0 Relevance and benefits of renewable energies

Anders W. (2007) stated that energy use in developing countries is closely linked to a range of social issues: poverty alleviation, education, health, population growth, employment, enterprise, communication, urbanization and a lack of opportunities for women. To mention just a few examples:

- cooking with poorly vented stoves has significant health impacts,
- hundreds of millions of women and children spend several hours a day gathering firewood and carrying water for household needs;
- lack of electricity means inadequate lighting, limited communications and no access to refrigeration or to a whole host of labour-saving devices and income-generating opportunities.

It follows that provision of modern energy services to the poor is a crucial prerequisite to meet the Sustainable Development Goals (SDGs). Developing countries need better access to stable and affordable energy supplies, as well as new technological solutions enabling efficient use of traditional and renewable energy sources.

Energy is also strongly linked to the climate and the environment. Most current forms of energy generation and use cause environmental problems at local, regional and international levels, threatening the health and well-being of current and future generations. The health impacts from solid fuel used for cooking and heat are serious: an estimated two million premature deaths per year because of indoor air pollution. Because of inefficient combustion the use of traditional biomass also adds significantly to global warming, (Anders W. 2007).

Renewable energies have the important potential of

1. allowing development and environmental challenges to be dealt with jointly.
2. providing increased security and economic stability.

## 2.1 Universal access to affordable, reliable and modern energy services

- through the accelerated, cost-efficient provision of clean electricity coupled with making clean cooking solutions a top political priority and moving away from using traditional biomass for cooking.
- Supported by recent progress in electrification, particularly in Least Developed Countries<sup>4</sup> (LDCs), and improvements in industrial energy efficiency.

## 2.2 Address development and environmental challenges

In recent years there has been a significant development of alternative energy technologies, both in terms of performance and cost reduction. Moreover, many developing countries are particularly well positioned when it comes to developing a new generation of energy technologies.

Renewables may allow developing countries to leapfrog directly into a clean energy scenario, thereby avoiding actually what Europe is facing today.

For example,

- a) simple technologies like solar water heaters, solar pasteurisers, wind pumps, improved cooking stoves, biomass briquettes, and biogas, have the potential to make a huge difference in ***securing modern energy services for the poor***.
- b) Grid-connected large-scale hydro plants and wind power have great potential to ***enable growth and development in developing countries***, while not countering ongoing efforts to mitigate climate change and reduce greenhouse gas emissions.
- c) The biofuels experience of Brazil, where the residue materials from sugar production are being used to produce ethanol, shows the ***great potential for modern biomass<sup>5</sup> in the tropical countries***.
- d) Combined heat and power (CHP), based on biomass, is another option that deserves serious attention.
- e) Use of solar thermal power plants in the African deserts – by using large-scale mirrors to concentrate the sun's rays on a pipe, that heats up a liquid that can power conventional steam turbines, electricity can be produced and then fed into European networks.

As world energy demand is expected to rise by some 60 percent by 2030 (as seen in all the estimates, for example the World Energy Outlook published in October 2006) the pressure to find alternative and efficient energy sources as well as to save energy is becoming greater.

<sup>4</sup> In the least developed countries, the proportion of the people with access to electricity more than doubled between 2000 and 2016.

<sup>5</sup> In many regions, the current use of biomass fuels requires women and children to spend many hours per week collecting and carrying traditional biomass that is burned in highly inefficient and polluting stoves. Yet, electricity generation, heat production and transport rely heavily on fossil fuels and together account for roughly 70 per cent of global greenhouse gas emissions, including 40 per cent from electricity.

Biomass burning is also a significant source of air pollution, therefore its use should be subject to strong regulations, and alternatives should be encouraged, particularly for cooking.



## 2.3 Increased security and economic stability

Increased use of renewable energy sources would

- a) reduce dependence on expensive fossil fuel imports and would help many countries **improve their balance of payments**.
- b) Renewable energy projects can have a significant impact on **job creation**; the ethanol program in Brazil, for example has generated almost a million new jobs in rural areas.
- c) benefit the poor by reforming the development agenda
  - ensuring substantial overseas development assistance (ODA) grants and soft loans are directed towards capacity building, clean technology for power production and appropriate small-scale renewable energy technologies at village level.
- d) Renewables can also generate additional incomes and reduce expenses by preventing the building of polluting and maybe already obsolete grids and plants.
  - Renewable energy such as solar, hydro-electric, biomass and wind can make a significant contribution to fighting the problems caused by the consumption of fossil fuels which include the strategic dependence on petrol producers, high fossil fuel prices, pollution and greenhouse gas emissions.
- e) Most developing countries - like Europe - are net importers of energy. Better access to sustainable energy services is necessary at macro level to foster economic growth, and at micro-level to stimulate businesses and income generating activities.
  - Small businesses, public buildings and homes need adequate energy for lighting, communication, water supply, heating and cooling. Streetlights, for example in Africa, are essential for safety at night.

## 3.0 Best Practices

China, alongside Germany, was the investment leader in new renewable energy capacity in 2005. We always talk about China as a matter of concern because of the massive creation of gas and coal plants. But it is also making efforts in terms of renewable energy production.

India has surpassed the wind capacity of Denmark, which is a front runner in that field.

Large scale investments by these emerging economies could drive the cost of producing renewable energy down considerably. In order to encourage a bigger share of these investments to be directed towards new and renewable energies, we must work together in intelligent partnerships to bring down the cost of new technologies and, generally speaking, to make them more available (Andris, P., 2007).

### **Best practices:**

Renewables in Australia, the use of renewable energy continues to rise, and currently provides around 16 per cent of Australia's electricity. In 2017, clean energy investment was Australia's highest on record, placing Australia seventh in the world. Several state and territory governments are undertaking procurements for grid-scale battery storage facilities in South Australia, and the world's largest lithium-ion battery (100 MW/129 MWh) has been installed there, providing grid stability to the

South Australian network, where close to 50 per cent of energy generation is from wind and solar.

Lithuania is seeking to increase the share of renewables with the ambition that they will account for 45 per cent by 2030, and 80 per cent by 2050, with renewables dominating in the electricity, heating and cooling and transport sectors.

Mexico is making dynamic progress towards reaching its target of 35 per cent of electricity generated by clean sources by 2024.

The use of Clean Energy Certificates accrediting production from sustainable sources, coupled with competitive auctions for solar and wind, boosted the share of renewables and resulted in low prices. Furthermore, a National Atlas of Areas with High Energy and Renewable Energy Potential promotes the use of renewable energy resources.

United Nations, 2018

#### 4.0 Significance of affordable and clean energy

A well-established energy system supports all sectors: from businesses, medicine and education to agriculture, infrastructure, communications and high technology. Access to electricity in poorer countries has begun to accelerate, energy efficiency continues to improve, and renewable energy is making impressive gains. Nevertheless, more focused attention is needed to improve access to clean and safe cooking fuels and technologies for 2.8 billion people (UN, 2021).

For many decades, fossil fuels such as coal, oil or gas have been major sources of electricity production but burning carbon fuels produces large amounts of greenhouse gases which cause climate change and have harmful impacts on people's well-being and the environment. This affects everyone, not just a few. Moreover, global electricity use is rising rapidly. In a nutshell, without a stable electricity supply, countries will not be able to power their economies.

In the current context of COVID-19, lack of access to energy may hamper efforts to contain COVID-19 across many parts of the world. Energy services are key to preventing disease and fighting pandemics – from powering healthcare facilities and supplying clean water for essential hygiene, to enabling communications and IT services that connect people while maintaining social distancing.

Despite significant progress made on various aspects of the SDG 7 prior to the start of COVID-19 crisis – notably a reduction in the number of people worldwide lacking access to electricity, strong uptake of renewable energy for electricity generation, and improvements in energy efficiency – global efforts remain sufficient to reach the key targets of SDG 7 by 2030 especially if the COVID-19 pandemic seriously disrupts electrification efforts.



The number of people without access to electricity declined from 1.2 billion in 2010 to 789 million in 2018, however, under policies that were either in place or planned before the start of the COVID-19 crisis, an estimated 620 million people would still lack access in 2030, 85% of them in Sub-Saharan Africa.

Countries can accelerate the transition to an affordable, reliable, and sustainable energy system by investing in renewable energy resources, prioritizing energy efficient practices, and adopting clean energy technologies and infrastructure. Businesses can maintain and protect ecosystems and commit to sourcing 100% of operational electricity needs from renewable sources. Employers can reduce the internal demand for transport by prioritizing telecommunications and incentivize less energy intensive modes such as train travel over auto and air travel. Investors can invest more in sustainable energy services, bringing new technologies to the market quickly from a diverse supplier base.

In Kenya, to promote investment in the renewables sector, the Government of the Republic of Kenya has over the years put in place various measures geared towards increased exploitation of renewable sources, these include:

- Enactment of the Energy Act No. 1 of 2019 – to develop, publish and review energy plans in respect of renewable energy to ensure delivery of reliable energy services and to, at a minimum, cost and develop a conducive environment for the promotion of investments in energy infrastructure development.
- Establishment of the Energy and Petroleum Regulatory Authority (EPRA) – to regulate production, conversion, distribution, supply, marketing and use of renewable energy.
- Establishment of the Rural Electrification and Renewable Energy Corporation (RERC) – to spearhead development of renewable energy resources in Kenya and to accelerate the pace of rural electrification in the country.
- Development of the National Energy Policy, 2018 – pursuant to this policy, the Kenyan Government has committed to the provision of affordable quality energy for all Kenyans to be achieved through the provision of clean, sustainable, affordable, competitive, reliable and secure energy services at the least cost while protecting the environment.

Wako J. & Ngumo J. (CMS Expert Guides), 2020

To meet the SDGs targets by 2030, countries must safeguard the gains attained prior to the COVID-19 outbreak and prioritise leaving no one behind, given the large proportion of the population without access that live in remote, rural, poorer and vulnerable communities. This will require stronger political commitment, long-term energy planning, increased public and private financing and adequate policy and fiscal incentives to spur faster deployment of new technologies.

## 5.0 Conclusion

Modern forms of renewable energy, such as bioenergy, geothermal, hydropower, solar and wind, are the most frequently mentioned renewable sources. This aligns with the global trend that these most technologically advanced sources count for over half of the total final energy consumption from renewable sources obtained worldwide as of 2015.

The fastest progress in renewables continues to be in electricity generation, where close to 25 per cent came from renewables in 2016 thanks to the rapid expansion of solar photovoltaics (PV) and wind. With renewable energy increasingly dominating power production, modernization of electricity transport and distribution, including options such as hydrogen and storage technologies, and electrification of energy end uses can become the drivers of decarbonization in the energy sector.

In 2016, nearly one fourth of electricity generation came from renewables, including solar PV and wind. Since 2009, the price of renewable electricity has dropped by 77 per cent for solar PV and by 38 per cent for onshore wind, while the cost of electricity from conventional sources has undergone only modest reductions. Renewable energy is the best answer to energy poverty, it helps to reduce CO<sub>2</sub> emissions, slows down the negative global temperature trend and proposes a feasible model for sustainable energy strategies.

In 2017, for the first time, the number of people without access to electricity dipped below 1 billion, but trends<sup>6</sup> on energy access fell short of global goals. A doubling of electricity demand in developing economies puts cleaner, universally available and **affordable electricity** at the centre of strategies *for economic sustainable development and greenhouse gas emissions reduction*. Electrification brings benefits – notably by reducing local pollution – and requires additional measures to decarbonize power supply if it is to unlock its full potential as a way to meet climate goals. The convergence of cheaper renewable energy technologies, digital applications and the rising role of electricity is a crucial vector for change (UN, 2018).

According to Andris, P. (2007), developing countries are themselves in strong positions to promote the use of renewable energies due to abundant renewable resources, including wind, solar, geothermal, biomass, and hydro. It is important that the developing world itself contributes, in terms of political willingness to engage on that path. Financial aid has kick-started the process of creating the right framework and the momentum for renewable energies.

- One example comes from the Democratic Republic of Congo: The Inga Dam in its last phase, Inga III, would actually be able to give electricity to almost the whole continent. This shows that the developing world, in this case Africa, has the potential to produce its own renewable energy. Of course, some financial and political support is necessary, but the potential exists in concrete terms.

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<sup>6</sup> From 2000 to 2016, the proportion of the global population with access to electricity increased from 78 per cent to 87 per cent



Amongst developing regions, Africa in particular offers a unique opportunity to use decentralized renewable energy technology in a competitive manner. It can by-pass the need for transmission grids and 'leap-frog' to a new generation of clean, local and low carbon energy sources and technologies – as already seen for mobile telecommunications. This is very revealing,

- for example, in sub-Saharan Africa, hardly any area had land lines. Now, everyone uses mobile phones. There was no grid, and today there is no need for landlines, except for Internet access, on a much more limited scale. The same could be done in the energy sector to bypass certain stages of development.

This is a real 'win-win' opportunity for collaboration between the developed and the developing world: to increase the penetration of clean renewable energy and to bring electrification to some of the world's poorest citizens. A special effort will be needed in sub-Saharan Africa, where rates of access to electricity are the lowest in the world.

Developing countries which are not petrol producers, need to promote the use of renewable energy to ensure access for their population to modern, reliable energy supplies. This form of energy can play a key role in reducing poverty and promoting sustainable development.

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