Fact sheet on transition from dirty fossil fuels consumption to clean renewable energy in Uganda.

Charcoal production employs many in Eastern part of Uganda, such as these young men in, yet is a primary driver of deforestation across this region.

Introduction and Background

Uganda is richly endowed with natural resources. In terms of energy, the country has abundant biomass, including large quantities of non-woody biomass, as well as peat and water resources. It also enjoys ideal solar, geothermal and wind energy potential. Water and biomass make the biggest contributions to the energy demands of Uganda's population. The total estimated potential of renewable energy resources is about 5,300MW. These resources remain un exploited and the unsustainable use of the available resources has, however, left the country with an inadequate supply of energy. This situation has resulted to dependence of dirty sources of energy by the population.

Globally, there is a transition from non-renewable fossil fuels to renewable clean energy sources such as hydroelectric, wind, and solar power. Many countries are ramping up their commitment towards renewable energy through innovation and investment. This transition is being motivated by many factors, including concerns about environmental impacts particularly climate change, limits on fossil fuel supplies, and prices.

In Uganda, the use of biomass has negative health, gender, and environmental consequences. Since most households in Uganda use firewood for cooking with majority cooking indoors with no chimneys and any ventilation, this exposes them to biomass smoke leading to chronic obstructive pulmonary disease which affects more women and children. Dependence on biomass energy is increasing pressure on natural resources, especially forests. The high rates of deforestation in Ugandans are partly attributed to charcoal burning and wood fuel, since forests supply well over 90 percent of Uganda's energy requirements in form fuel wood. The National Forest Authority (NFA) estimates that Uganda has been losing 250,000 ha of forests annually for the period 2005-2010 (MWE, 2016). In most households in Uganda, its women who often know the energy needs of a home and struggle every day to ensure that food is on the table, despite the hardships they experience using the energy sources at their disposal. However, it is on rare occasions that the women are involved in acquisition of clean or improved energy sources.

The country is highly vulnerable to climate change and variability, its economy and the wellbeing of the people are tightly bound to climate. Human induced climate change in the coming century has the potential to halt or reverse the country's development trajectory. In particular, climate change is likely to mean increased food insecurity; shifts in the spread of diseases like malaria; soil erosion and land degradation; flood damage to infrastructure and settlements and shifts in the productivity of agricultural and natural resources. It is the poor and vulnerable who feel these impacts the hardest, though climate change has serious implications for the nation's economy. Exacerbating poverty and triggering migration as well as heightened competition over strategic water resources, climate change could lead to regional insecurity.

The Government of Uganda has made domestic and international commitments to increase access to modern energy services to all Ugandans. In the Vision 2040, and Rural Electrifcation and Strategic Plan (2015-2022), government targets to increase access to clean renewable energy and by 80% with a total installed generation capacity reaching to 41,738MW. Further, under the Sustainable Energy for All (SE4ALL) Action Agenda which was launched by the United Nations (UN) Secretary General in September 2010, Uganda targets to double the share of renewable energy in the energy mix by 2030.

The abundance of renewable energy resources presents a great opportunity for Uganda to ensure energy mix by investing in all forms such particularly solar power which is cheap, reliable and affordable. However, up to date, Uganda has found it challenging to utilize renewable energy resources and to ensure energy mix to accelerate energy access. The biggest challenge is limited financing and investment towards off-grid and efficient energy sources. Government efforts have largely focused on increasing energy access by increasing supply through investing in hydro-electricity plants. However, additional capacity comes at a hefty cost. On average, the investment cost per MW is US$2.6M. This cost does not account for the cost of transmission and distribution to deliver electricity to end-users. Uganda's electricity household tariffs are currently US$0.18 per kWh which is high for most households and is hampering energy access.

Uganda's energy access is a challenge given that only 21.6 per cent of the population have access to electricity and over 95 per cent of households depend on biomass for cooking.

Access to affordable sustainable energy greatly improves lives through supporting new businesses, minimizing climate change impacts, improving education system, powering agricultural value addition, improving health at homes and in health facilities and contributing to employment creation. Therefore, the only way to prevent the severe negative effects and consequences of climate change, the government of Uganda must shift from fossil fuels consumption to clean renewable energy transition.

1.1 Problem statement

Uganda's economy, livelihoods and social wellbeing are highly vulnerable to climate variability and the challenges imposed by the climate. The impact of climate change includes increased frequency and intensity of droughts, floods, glacial melting, landslides and heat waves, all of which will significantly affect the livelihoods of local communities that largely depend on natural resources. Uganda's energy sector has the potential to contribute adversely to climate change, through the production of Greenhouse Gases (GHG) from thermal power generation, for example. Conversely, the sector can be adversely affected by climate change due to the high dependence on hydropower generation. There is need to integrate climate change considerations into the development and utilization of clean renewable energy resources in order to ensure mitigation, adaptation and resilience.

The majority of the Ugandan population, which lives in the rural areas, get their energy from biomass. This causes massive deforestation and loss of soil fertility, which again results in climate change and the reduction of agricultural productivity. Due to the rapid population and economic growth in the country, the demand for electricity is very high with only 22% of the country with access to electricity and 10% only in the rural areas. There is therefore a need for affordable, accessible and sustainable electricity production. solar energy resource is an indigenous energy resource for the country and has a high load factor; the development cost is competitive and environmentally friendly, and can be used for both electricity production and direct use in industry and agriculture.

The fact sheet, therefore, will empower stakeholder with information on how to influence the decision-making processes, policies and laws that promotes transition to cheap clean renewable energy and increase mitigation measures for climate change impacts in Uganda.

2.0 Uganda's commitment to reduce green gas emissions

The government of Uganda with technical support from United Nations Development Programme (UNDP) launched a Nationally Determined Contributions support programme in October 2018, to scale up public and private investment in climate change mitigation measures. The launch was part of the country's efforts to address climate change and meet its obligations in the Paris Agreement.

The losses associated with climate change Uganda continue to grow such as extreme weather conditions like flooding have damaged roads infrastructure and ruined crops leading to food insecurity. Further, the reduced snow cover on mountain Rwenzori and increased spread of epidemics like Malaria are indicators of Uganda's vulnerability to climate change.

Although the government stepped up to meet the climate change commitments in Nationally Determined Contributions to reduce greenhouse gases emissions by 22% by 2030, efforts are significantly low with majority of the population still depending on dirty fossil fuels for cooking, heating and lighting. The country is further investing much in oil and gas projects will approximately release more than 34milliom tons of carbon dioxide in the atmosphere which undermines the government's efforts to reduce the greenhouse gas emissions by 22%.

There is need for the country to reduce greenhouse gas emissions in forestry and wetlands, energy, transport and agricultural sector. This will catalyze investment towards realizing Uganda's commitment for 22% greenhouse gas emissions reduction by 2030. It is clear that climate actions are integrated into the third National Development Plan, which includes mitigation measures, priority sectors and gender responsive implementation. The government should therefore consider investing much in clean renewable energy sources as a mitigation measure for greenhouse gas emissions reduction.

2.1 Why Uganda should transition from fossil fuels consumption

As climate change continues to climb to the top of the Uganda's agenda, there is need to transition away from fossil fuels to renewable energy sources. The Paris Agreement for which Uganda is signatory to, proposed to keep the increase in global average temperature to well below 2°C above pre-industrial levels. This target is the political consensus based on scientific assessment that is thought to limit the negative effects of climate change. In reality the 2°C target does not provide certainty of keeping the world's climate stable.

Research shows there is only a slim chance that the earth will avoid warming by at least 2°C by the end of the century. There is a 30% chance of an increase well above 2°C bringing global catastrophic risks that would seriously threaten human well-being. A 4°C temperature rise, above pre-industrial levels, would be like being in an oven and destroy modern civilization.

The country's average surface temperature continues to rise, having an impact on weather systems. Extreme weather events are becoming more prevalent and more violent with torrential rainstorms, landslides, environmental degradation, excessive dry season leading to loss of forest cover and many others. In addition, rising sea levels are putting coastal communities at risk of flooding, water resources are in decline and land affected by drought is set to grow.

With almost 90% of Uganda's energy mix still in the hands of the fossil fuels consumption, urgent action is needed to reduce the emissions of greenhouse gases. To help prevent global warming we need to replace fossil fuels with clean renewable energy.

Therefore, solving the global warming problem by reducing the greenhouse gas emissions, implementation of clean renewable energy transition is required by the government of Uganda to increase investment in clean renewable energy resources particularly solar power which has cost effective and carbon free in the atmosphere.

2.2 How countries that have transitioned to clean renewable energy improved increase to energy access

Most of the countries in Africa like Ethiopia, India, Senegal have transitioned to clean renewable energy after realizing the consequences of depending on dirty fossil fuels. For instance, the government of Ethiopia shifted to solar power and provided off-grid energy to households and enterprises across the country. Under its Growth and Transformation Plan (GTP II), the Government of Ethiopia set ambitious targets for expanding access to off-grid energy through solar technologies, including 3.6 million lanterns, 400,000 solar house systems and 3,600 solar photovoltaic (PV) systems for rural health centers, schools and other government service centers by 2020.

The country's access to electricity to rural households in 2005 stood at 1.2%, while the rest used kerosene and firewood, however, by 2017, the country had increased to 26% whereas kerosene and firewood use for lighting, heating and cooling dropped to under 8% of the population.

There is a range of off-grid products available to Ethiopia. Off-grid electricity is currently used for lighting, charging mobile phones, and the provision of electric power to rural health centers, schools and water pumping systems, among other uses, and has seen remarkable growth in the past five years. In addition to falling global prices for solar equipment, this transformation directly attributed to the introduction of fiscal e.g. tax exemptions for imports and technical regulations like Global Off-Grid Lighting Association approved standards, as well as increased access to financing, made available to suppliers and consumers.

Furthermore, Austria embarked on its energy transition some decades ago and now stands at a record of 100% renewable energy access. Due to geographical conditions, energy production in Austria relies heavily on renewable energies, notably hydropower. 78.4% of domestic production in 2013 came from renewable energy, 9.2% from natural gas and 7.2% from petroleum. On the basis of the Federal Constitutional Law for a Nuclear-Free Austria, no nuclear power stations are in operation in Austria. But domestic energy production makes up only 36% of Austria's total energy consumption, which among other things encompasses transport, electricity production, and heating. In 2013, oil accounted for about 36.2% of total energy consumption, renewable energies 29.8%, gas 20.6%, and coal 9.7%. In the past 20 years, the structure of gross domestic energy consumption shifted from coal and oil to new renewables, in particular between 2005 and 2013.

The EU target for Austria require a renewable share of 100% by 2020 (gross final energy consumption). Austria is on a good way to achieve this target. Energy transition in Austria is also seen on the local level, in some villages, towns and regions. For example, the town of Güssing in the state of Burgenland is a pioneer in independent and sustainable energy production. Since 2005, Güssing has already produced significantly more heating (58 gigawatt hours) and electricity (14 GWh) from renewable resources than the city itself needs.

With the above cases of how countries have transitioned to clean renewable energy improved their economies and people's standards of living, the government of Uganda must change the focus to the abundant renewable energy resources in the country to fulfil its commitment under the Sustainable Energy for All and Vision 2040 of increasing energy access to Ugandans by 2030.

2.3 The risks of depending on fossil fuels in Uganda

Over 90 percent of energy used in the country comes from fossil fuels, according to the Uganda Bureau of Statistics. Biomass, wood fuels, oil and coal are the fossil fuels utilized to create energy. The demand for these fossil fuels is expected to increase in coming decades due to an expanding economy. While these fossil fuels provide reliable energy for consumers, there are some major risks associated with the energy source as included below.

Greenhouse gas emissions

Fossil fuels cause environmentally unsafe compounds to form in the atmosphere, depleting ozone levels and thus creating a spike in skin cancer rates. Burning coal releases sulfur oxide while the combustion of car engines and power plants gives off nitrogen oxides, which cause smog. Water and oxygen bonding with those sulfur and nitrogen oxides also causes acidic rain, which damages plant life and food chains. Areas of high air pollution indexes have populations with higher rates of asthma than cleaner environments do.

Global warming

Global warming occurs when carbon dioxide accumulates in the atmosphere. Carbon monoxide is produced by the combustion of fossil fuels and converted into carbon dioxide. As a result, the surface temperature of the earth is increasing drastically. The increase is enough to distress the ecological systems. Implications include severe weather, droughts, floods, drastic temperature changes, heat waves, and more severe wildfires. Food and water supplies are threatened. Tropical regions will expand, allowing disease-carrying insects to expand their ranges.

Environmental degradation

Reliance on fossil fuels stresses plants and trees which play an important role in regulating climate. They absorb carbon dioxide from the air and release oxygen back in the atmosphere. Forests and bush land act as carbon sinks and are a valuable means of keeping global warming to 1.5°C.

Due to dependence on fossils, Uganda losses about 100,000 hectares of forest cover every year approximately 25 million tons of wood are consumed annually in Uganda with the majority of

that wood used as household firewood (65%), charcoal (16%) and commercial and industrial firewood (14%). The fossil fuel industry also leases vast stretches of land for infrastructure such as wells, pipelines, access roads, as well as facilities for processing, waste storage, and waste disposal. In the case of strip mining, entire swaths of terrain including forests and whole mountaintops are scraped and blasted away to expose underground coal or oil. Even after operations cease, the nutrient-leached land will never return to what it once was.

As a result, critical wildlife habitat, land crucial for breeding and migration ends up fragmented and destroyed. Even animals able to leave can end up suffering, as they're often forced into less-than-ideal habitat and must compete with existing wildlife for resources.

Health impacts

The reliance on fossil fuels in Uganda has increased on a number of cases of diseases. The fossil particulates are linked to heart diseases, cancer, respiratory illness and stroke. The impact of dirty fossil fuels consumption continues to affect the health of Ugandans especially the vulnerable communities in rural communities.

3.0 Conclusion

Our dependence on fossil fuels as an energy source is tied to the fact that they are relatively cheaper to extract and use compared with other hydro power sources. But this ongoing dependence carries with its serious environmental effects. In fact, if things continue the way they do at present, the next generation could see the global climate becoming inhospitable for human life. This is why we have to start, right now. We need to move away from fossil fuels to more renewable and sustainable energy sources.