



Balancing Climate Change Mitigation to Address Both Environmental Safety and Economic Growth and Development

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Abstract- Climate change mitigation is all about ensuring that adverse impacts of climate change are minimized and that our earth is made environmentally safe and sustainable from generation to generation. But mitigation is a collective action that must be implemented collectively. Mitigation targets specifically emission reduction and rolling back the use of three major fossil fuels: coal, oil and natural gas. Fossil fuels power the global economy since the time of Industrial Revolution of the 18th century. This paper reviewed the climate change treaties, conventions and agreements, and all these instruments target energy based mitigation measures that will reduce emissions of greenhouse gases by transiting from fossil fuels to renewable energy and energy efficient economy. But this paper agrees that mitigation if well implemented will ensure that the planet earth is environmentally safe and secure but this feat comes with some economic costs in terms of loss of jobs, revenues, and influence for multinational oil companies and oil producing and exporting countries whose life wire is interwoven with fossil fuels. Some countries including United States are not implementing any emission cuts because of perceived negative economic impacts. But the good news is that emission can be minimized without necessarily weaning the global economy of fossil fuels. There are technologies such as carbon capture and storage that can suck carbon dioxide in industries and power plants storing it safely underground where it will not reach the atmosphere to warm the earth. There is also non-energy mitigation strategy which targets forests and land use. Forests and good agronomic practices act as sinks for storing carbon. Trees absorb carbon in their leaves and tissues and agronomically, soils store carbon underground. This paper concludes that the best mitigation measures are those that will ensure environmental safety for our earth without tampering with the economic prosperity inclusive growth and development of all the nations of the world.

Keywords- *Climate, Environmental, Impacts*

I. INTRODUCTION

Climate change is one of the serious environmental threats facing humanity and human civilization. Global warming and climate change are now considered serious developmental issues because they are capable of reversing gains already made on poverty reduction, agriculture and food security,

access to quality health, water and sanitation and inclusive development.

In fact, Human Development Report (2007) sees development as increasingly being hindered by climate change and has taken the fight against poverty and the fight against climate change as interrelated efforts.

To underline the impact of climate change on development, the United Nations Sustainable Development Goal (SDG) Number 13 makes a case for urgent action to be taken to combat climate change and its impacts.

Climate change impacts can be combated in two principal ways- mitigation and adaptation. Mitigation targets emission reductions, but adaptation is about building resilient to lessen the vulnerability of people, property and the biosphere to any climate change induced hazard (Wright, 2007).

Most mitigation measures while promoting environmental safety on one hand, on the hand, tend to constitute threats to economic growth and prosperity. But the focus of this study is to demonstrate that climate change mitigation can be integrated to ensure that both environmental safety and economic development and growth happen simultaneously for the benefit of our earth and for the enhancement of human welfare and sustainable development.

II. CLIMATE MITIGATION MEASURES

Mitigation according to IPCC (2013) is a human intervention to reduce the sources or enhance the sinks of greenhouse gases. The main goal of mitigation as expressed in the Article 2 of United Nations Framework Convention on Climate Change (UNFCCC) is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

Energy based emission reduction can be achieved through two principal ways- carbon taxation and cap- and – trade systems. Under a carbon tax, emitters are required to pay a price for every tone of emissions generated and under cap and trade, the government sets an overall emission cap. It then issues tradable allowances which are form of permits to pollute subject to a given ceiling and businesses emit below their allowances sell to those emitting beyond permitted thresholds (Human Development Report, 2007).

But under the Kyoto Protocol of 1997, there are three flexible mechanisms for emission reduction. These are: International Emission Trading (IET), the Clean Development Mechanism and Joint Implementation. International Emission Trading is a mechanism that allows countries and business to trade their emissions in carbon markets.

The Clean Development Mechanism (CDM) is a production reduction system that encourages emission reductions in non-Annex One Parties while Joint Implementation encourages production of emission reductions in Annex One Parties (Kyoto Protocol, 1997). But both taxation and carbon trading have not worked in the reduction of emissions of greenhouse gases. On the contrary, there is strong evidence that emissions of the major greenhouse gases-carbon dioxide and methane are actually increasing because of aggressive production and intensive use of fossil fuels by emerging economies especially China, Brazil and India, Indonesia and Mexico. China overtook the United State of America as the largest emitter of carbon dioxide in the world in 2008 (Rachman, 2010).

From the foregoing, it is obvious that both carbon tax and carbon trading will hurt businesses and economic growth. Taxing carbon will increase the cost of energy and ultimately goods and services and if cost of goods and services increase demands will fall and jobs will be lost and economic growth will decline. This is a simple logic of economics. Carbon trading is not a better option either because only few countries outside the European Union have viable carbon markets and moreover, carbon market is not truly a competitive market in which all the players are satisfied. In some carbon markets, prices of carbon are so low that emission credits are worthless and generate no income and if this happens, the incentive to pollute is enhanced.

If emission reduction will hurt businesses and economic growth, there are alternatives measures such as Carbon Capture and Storage (CCS) and geo-engineering.

CCS is a technology where carbon dioxide emissions are captured and sequestered underground to limit their global warming potential.

Cleaner coal is possible as some countries such as China and India are still planning more coal fired power capacity but coal plants can be made cleaner by Incorporating Integrated Gasification Combined Cycle (IGCC) and carbon capture and storage in the design of new coal powered plants (International Climate Change Taskforce, 2005) Geo-engineering is a mitigation process involving altering natural processes to reduce the heat trapping power of greenhouse gases and to ensure that global warming is minimized.

The Economist (2010) explains some of the geo-engineering processes that are already receiving attention in research and development laboratories across the world to include smoging up air to reflect more sunlight into space, creating carbon sink using plants or chemistry and locking up glaciers of the world's ice caps to reduce their disintegration into the ocean and cause sea levels to rise. Geo-engineering is called Plan B which is in the pipeline and will be executed if present mitigation strategy of reducing carbon emissions by

transiting to low carbon economy fails to achieve desired goal (The Economist, 2010).

III. ENVIRONMENTAL SAFETY CONCERNS

Empirical studies have shown that global warming and climate change portend serious threats to the planet earth in various ways. For example, the various ecosystems, the various processes such as the hydrological cycle, the wind systems, ocean currents are already showing unequivocal impacts of climate change.

The oceans are getting warmer, the ice caps are melting, sea levels are rising and some extreme meteorological or weather events such as hurricanes, typhoons, droughts and floods are not only coming with more furies but with increasing frequency too. For example, the United States of America has been hit by devastating hurricanes such as Katrina, Sandy, Harvey and Irma. Katrina which divested New Orleans in 2005 took thousands of lives. According to Kluger (2017) Katrina was perhaps the most expensive hurricane in U.S history, costing an estimated \$160 billion when all the counting was done. Property damage wrought by Irma and Harvey is equivalent to about 1.5 Gross Domestic Product (GDP) of the United States of America and the cost of Hurricane Irma to some Caribbean Islands, exceed their GDP (The Economist, 2017).

Extreme weather events happen all over the world not only with more intensity but with greater frequency too. For example, Gore (2006) observed the high frequency of typhoons in Japan and cyclones in Australia. In 2004, Japan was hit by 10 powerful typhoons and Australia suffered devastation by very strong cyclones (Category 5 types) with cyclone Monica recorded as the strongest cyclone ever measured as it was far stronger than Katrina, Rita or Wilma.

To show that extreme weather events are not flukes, the South Atlantic has recorded her first hurricane in Brazil (World Climate News, 2005). Hurricane Catarina was category one hurricane and recorded on 24th March in the Brazilian State of Santa Catarina. Earth scientists never believed that hurricane would ever occur in the South Atlantic Ocean as all the hurricanes recorded so far occurred in the North Atlantic Ocean.

Droughts have intensified not only in the traditional Sudan-Sahelian region of Africa but in other places such as California, India, China, Mexico and South Africa.

Temperatures are soaring across the world, precipitating heat waves. For example, Begley(2011) recorded that the heat waves in Russia killed about 1500 people. And Enger and Smith (2004) and Ajadike (2015) reported that the Chicago heat waves killed about 700 people when temperatures exceeded 32°C in July, 1995.

The truth is that extreme weather events such as heat waves, hurricanes, typhoons, cyclones, floods and droughts are coming with greater intensity by killing more people and destroying more property and social infrastructure than ever before across the globe. No part of the earth is spared of the fury and the destructions of these extreme weather events.

Unequivocally, climate change and extreme weather events are making our earth insecure and unsafe for development both for human prosperity and economic development and growth, and this calls for serious climate change mitigation measures to ameliorate the situation.

IV. IMPACTS OF CLIMATE CHANGE MITIGATION ON ECONOMIC DEVELOPMENT AND GROWTH

Climate change mitigation is desired because it involves activities and processes aimed at reducing emissions of greenhouse gases that cause global warming and climate change, but some mitigation measures will negatively impact on the economic activities of many nations. This is because climate mitigation is preaching the gospel of clean energy, renewables, energy efficiency, conservation of forests and sustainable agriculture all aimed at reducing carbon emissions, global warming and climate change.

But some countries are not really buying into some mitigation measures because of possible economic ripple effects. For example, some Eastern European nations including Poland, Bulgaria, Romania and Slovakia whose economies still depend on coal were very reluctant in switching to cleaner energy sources because of possible economic costs and loss of economic competitiveness. This fact probably prompted Mikolaj Dowgielewicz, Poland's, European minister to say that they would continue to burn coal because in his own words. "Coal is our energy security" (The Economist, 2008).

Oil producing nations including the OPEC (Oil Producing Exporting Countries) that still depend on oil and gas exports as their major revenue earner are not comfortable for all the talks about emission reduction and the transition to low-carbon economy. Virtually all the OPEC member nations especially those running mono-cultural oil economies would be in deep economic trouble if oil, their main commodity of trade is relegated as a result of climate change mitigation measures that favour switching global energy needs to renewable sources.

Fossil fuels such as coal, oil and gas still power the global economy especially via transportation, heating, cooling, agricultural mechanization and industrial automation. For example, coal was the energy king between the 1800s and 1920s when coal provided about 80 percent of all energy used in the United State (Wright, 2007).

Following the discovery and development of internal combustion engines, petroleum started to displace coal as the principal source of energy in the world. Then came natural gas, an energy source that is cleaner than both coal and oil but more difficult to distribute to end users except by expensive pipelines or as liquefied natural gas (LNG). Emphasizing the importance of fossil fuels- crude oil, gas and coal, (Wright 2007) observed that the three fuels currently provide 83 percent of United States energy consumption and 79.5 percent of world consumption. As climate mitigation targets the minimization and final cessation of the use of fossil fuels, fossil fuel producing companies will start to lose relevance in economic terms. They will start to reduce investments in exploration, exploitation, processing and refining, transporting and

distributing functions worldwide. Companies such as Royal Dutch/Shell, Exxon Mobil, Texaco and Chevron are amongst the richest companies in world. Heavily capitalized, infrastructural rich and operate in geographically diverse regions of the world. These oil companies and their subsidiaries employ millions of staff across the globe.

What climate mitigation and transition to low carbon economy truly means for these multinational oil and gas companies is economic death nail as they will go into economic decline, shedding millions of staff, assets and ultimately, folding up.

V. DISCUSSION

Most globe efforts to limit global warming and climate change have focused on reducing emissions by taxing carbon, reducing fossil fuels and ultimately transiting to renewable world where fossil fuels such as coal, oil and natural gas are made irrelevant in the global energy market.

All the global treaties and protocols to reduce greenhouse gases such as the United Nations Framework Convention on Climate Change (UNFCCC, 1992), the 1997 Kyoto Protocol that came into effect in 2005 and the 2015 Paris Climate Agreement but came into force on the 4th November 2016 emphasize emission reductions by gradually transiting from fossil fuel based economy to low carbon, renewable and green economy.

All the members of the global community agree that impacts of climate change must be mitigated in order to protect and preserve the earth from generation to generation but differ on the methodology of achieving this desired goal. These differences arise because achieving environmental safety and security for the earth will come with some economic costs that can impact negatively on growth and inclusive economic development of the world.

Kyoto Protocol failed to achieve its goal principally because pledges of emission cuts by developed countries could not be realized because of likely negative effects on the welfare of their people and their economies. What probably doomed Kyoto protocol was the absence of some key players especially nations like China, India and Indonesia that were excused from emission cuts since limiting their emissions was seen as likely to limit their burgeoning economies (Walsh, 2008).

United States responded very harshly to the UNFCCC of 1992 when their president, George Bush Senior proclaimed that the United States way of life was not up for any negotiation (Brown, 2004). Because of purely economic considerations, the United States and Australia failed to rectify the Kyoto Protocol fearing a possible economic backlash. Justifying the rejection of the Protocol, president Gorge W. Bush (jnr) in 2001 said that the Kyoto Protocol would have required the United States to make deep and immediate cuts in our economy that would have cost our economy up to US \$400 billion and would have led to 4.9 million jobs and as the president of the United States charged with safeguarding the

welfare of the people and American workers, I will not commit to unsound international treating that will throw millions of Americans out of work (Brown, 2004).

The 2015 Paris Climate Change Agreement is also being trailed by disagreement by United States of America. The current president Donald Trump refused to rectify the agreement that was signed by the former president, Barack Obama. Again citing negative economic impacts such as loss of America's global economic competitive edge, weakening of already established high standard of living for the America people and loss off millions of jobs. Supporting the likely economic impacts, Walsh (2008) said that cutting United States carbon emissions as proposed by senators John Warner and Joseph Lieberman by 70percent below 2005 level from 2012 did not go down with manufacturers and industry groups who warned that such emission cuts could cause about 4 million jobs losses by 2030 and erode US GDP by up to \$669 million per year.

All the climate change treaties, protocols and convention are resolute on transiting to low carbon and green economy in order to achieve a safer and healthier planet but without considering that such low-carbon future might come with serious economic trade off.

The good news is that there are alternative strategies that could deliver both environmental safety and economic security to the people of the world.

VI. RECOMMENDATIONS

First, instead of outright transiting to low carbon and renewable economy between 2020 and 2030 as agreed in 2015 Climate Agreement, fossil fuels should be made cleaner and less polluting. For example, new technologies have come out with efficient cars that use less fuels and emit less carbon dioxide. Such less polluting vehicles are currently available only in America and Europe, efforts should be made for these low fuel consuming vehicles to be available and accessible to all people of the world through technology transfer as contained in the 2015 Climate Change Agreement.

Second, natural gas should be widely adopted as the fossil fuel of choice in powering the global economy because it is the cleanest of all fossil fuels. According to Porritt (1993), natural gas produces only 56percent of the carbon released by coal for a given heat output.

Third, there are already technologies that can be adopted to capture carbon dioxide from the atmosphere and ensure that it does not contribute to global warming. Carbon Capture and Storage (CCS) is capable of scrubbing carbon dioxide from industries and power generating plants storing it in the ground or converting it for other industrial uses such as road building. Indeed (World Energy Outlook, 2009) reported that carbon capture and storage in power sector and industry can lead to 10 percent of emissions savings by 2030 in business as usual scenario. And IPCC (2007) shows CCS as a key mitigation technology especially in the energy supply and industrial sectors of the economy.

Fourth, nuclear power is one energy source that has a lot of potentials in post-carbon economy. For example, it has very low carbon emission. And Girardet and Mendonca (2009) noted that nuclear power has many advantages. For example, it can be built quickly and safely and it can supply base load power among others. But the major drawback is what to do with spent fuel and how to ensure that nuclear fusion materials do end in the hands of terrorists or rogue states such as North Korea. Serious researches are ongoing to handle nuclear wastes from nuclear power plants and many modifications are now incorporated into the design of modern nuclear power plants for greater safety and containment of possible nuclear accidents.

Lastly, apart from energy based mitigation measures, there are also non-energy mitigation measures such as forest and good Land Use management practices. Non energy mitigation is also called AFOLU (Agriculture, Forestry and Other land use) (IPCC, 2013) Reduced Emissions from Deforestation and Forest Degradation (REDD) is an integral part of AFOLU and deforestation and forest degradation accounts to as high as 20 percent of global annual emissions (Pagiola and Bosquet, 2009). So reducing both deforestation and forest degradation and engaging in sound land management practices would greatly reduce carbon emissions because forests sequester carbon, ensuring that carbon is stored in their leaves and tissues instead of reaching the atmosphere and contribute to global warming.

VII. CONCLUSION

The global community demands a cleaner, safer and healthier world but not at the altar of reduced standard of living and gloomy economic future for the people of the world. The recommended climate change mitigation measures in this paper are therefore the ones that are capable of addressing environmental safety concerns and economic prosperity, development and growth in an integrated manner.

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