

MITIGATING CLIMATE CHANGE IN NIGERIA: FUEL SUBSIDY REMOVAL AS A POSSIBLE POLICY OPTION

By

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ABSTRACT

This paper argues that policies that discourage the demand for non-renewable energy can be used to cut down CO₂ emission as it would help to discourage consumption patterns away non-renewable energy sources. The transmission mechanism can be deduced from the high price that the withdrawal of fuel subsidy would bring and the resultant downward adjustment in non-renewable energy use in consumption and production (such as emission from vehicles) which would bring about reduction in total emission. The study focused on Nigeria as a significant oil producing country in Sub Saharan Africa and employs narrative method for its analysis. The study concludes that while fuel subsidy removal policy (in the short term) would have welfare implications, in the long run, the policy would bring about greener growth and enhance sustainable development.

Key Words: *Fuel Subsidy; Second Best; Climate Change; Green Development*

JEL Classification: *H25; D52; Q54; Q48*

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1. INTRODUCTION

Africa contributes less than 4% to global greenhouse gases but it is most vulnerable to climate change (African Partnership Forum, 2007). The most populous nation in Africa is Nigeria and it is a significant producer of crude oil in the continent. Crude oil is a non-renewable energy and its exploration in the past 50-100 years globally, has contributed to increased carbon dioxide (CO₂) and other trace gases emission (Dilon and Thompson, 2008). To address the impact of climate change in the future therefore, switching to clean energy (renewable energy) would be a valuable option and has been advocated by many (see Skjærseth and Skodvin, 2001; and African Partnership Forum, 2007). Why other studies (e.g. IPCC, 2007; and Spurgeon *et al*, 2009) have advocated for a switch to renewable energy as a way of cutting down future emission, alternative ways of addressing climate change should be encouraged in other to get nations of the world approach climate change and its impact more seriously especially for countries like Nigeria given its crude oil potentials, population and land mass.

Over the years, various governments in Nigeria have subscribed to subsidizing the pump price of crude oil in Nigeria. Among other reasons for the subsidy, the most occurring has been to improve the welfare of Nigerian's since the country depends heavily on crude oil revenue and any increase in the pump price of fuel has shown to always increased general prices both in the formal and informal sector (see Arinze, 2011). It can be deduced from Adenikinju (2012) that the economic argument usually offered for subsidy withdrawal or reduction is that crude oil prices are Market determined thus, fixing the price below the market determined price, leads to the overall inefficiency of existing refineries and breeds corruption since importing fuel

then becomes more profitable than refining it in the domestic market. Thus, fuel subsidy removal would enable refineries to be more efficient and attract private investment into the sector. On the other hand, the argument offered against subsidy removal is that it leads to the immediate increase of the prices of most goods and services, and the amount removed as subsidy is likely to end up in the pocket of corrupt government officials thus, making the economy worse-off (see Adenikinju, 2012). In the face of Climate change, however, all these arguments could take a different dimension. The aim of this study therefore, is to provide a documentation about the implication that climate change has for Nigeria's crude oil market (and the economy at large), as well as, to provide a normative analysis as attempt to conceptualize fuel subsidy removal as climate change mitigation in Nigeria. Though the studies of Adekinju (2012), Friends of the Earth (2011) and Breyer *et al* (2010) have provided some evidence on the impact of fuel prices on the economy, their analysis did not directly examine the possibility of looking at fuel subsidy removal as a climate change mitigation strategy i.e., as a way of cutting down future CO₂ emission. The next section presents a conceptual analysis of climate change while the third section reviews empirical and theoretical literature. Section four presents the narrative analysis on fuel subsidy withdrawal and possible implications on emission. Lastly, section five presents the conclusion and summary of the paper.

2. CONCEPTUAL ANALYSIS

Climate change affects crude oil demand and supply through prices. The effect which can either be neutral, negative or positive varies across countries (IPCC, 2007). Due to the emission of CO₂ and other trace gases that are associated with the refining and use of crude oil, the crude oil contributes significantly to global warming. Though, renewable energy sources serves as alternative for crude oil, these options have not assumed the position of perfectly substituting the use of crude oil for transportation, domestic and other industrial purposes. As a result, the crude oil remains a major non-renewable energy source that contributes significantly to global warming and climate change. According to Spurgeon *et al* (2009), climate change, through sea level rise and extreme events (floods for example), has also led to the destruction of coastal properties and oil pipelines there by, reducing crude oil supply.

Another factor is pipeline vandalization and oil spillage. Oil spillage has over the years led to the destruction of farm land and the contamination of ground water in Nigeria. For many youths who are then displaced from their source of livelihoods, they result to pipeline vandalization and hence distorting crude oil supply. On the demand side, the demand for crude oil has continued to increase globally. While climate change factors have contributed to the reduction in crude oil supply, economic agents across the globe have not allowed climate change thinking to adjust their consumption and production pattern to correct the imbalance between crude oil demand and supply. Therefore, since crude oil demand is higher than supply, international crude oil price rises to equilibrate demand and supply (Arinze, 2011). To close the supply gap, countries like Nigeria import crude at international-market determined prices to meet up the increasing demand-over-supply which the

government have for a while been subsidizing to allow pump price sell at maximum prices (a controlled price that is below the pump market price) (Adenikinju, 2012). The implication of this is that, with the price of fuel below the market determined price, consumption and production pattern that encourages higher demand for crude oil will continue. This will mean emitting higher CO₂ and other trace gases to the atmosphere hence, compounding climate change.

3. REVIEW OF LITERATURE

In a study by Friends of the Earth (2011), they argued that cutting down emissions should be driven by the need to switch to cleaner energy use especially in the transport sector. Though a move to electric cars might not be feasible by 2020 for instance, even so, the carbon-cutting potential of electric cars will only be fully realised if the electricity that powers them comes from renewable sources such as wind turbines and solar panels. An interesting suggestion made to cut transport emissions in the short term the study suggests is that, conventional cars should be made greener by reducing the need to travel and persuading people to leave their cars at home and travel by greener means. Another issue raised in the study is the huge potential for rapid behaviour change as a means of cutting down emission provided the right policies and incentives are put in place. For instance, most car journeys are short, with more than half less than five miles in distance and that, such journeys could easily be made by walking or cycling, or on public transport.

Adenikinju (2012) argued that fuel subsidy has resulted in substantial loss of revenue in Nigeria and an exponential growth in domestic oil consumption in the country since low price do not signal real cost of consumption. Though the study did not relate

to climate change directly, it suggests that low fuel prices leads to high consumption level of fuel due to its relatively low price. The argument the present study seeks to advance from this is that, the exponential growth in the consumption of domestic oil consumption, leads to increased emission and if sustained, will not help to cut down future emission. According to Breyer *et al* (2010), price setting for crude oil is a major driving force for fuel prices. They argued that crude oil price might have already entered the era of peak-oil, i.e. degrading and diminishing resources, which will maintain sustainable high fossil fuel prices. And that, climate change mitigation efforts, which leads to higher CO₂ emission cost, will further increase fossil fuel related energy cost. The study suggests that Photovoltaic (PV)² electricity can partly or fully reduce costly dependence on fossil fuels and act as fuel and cost saving energy option.

To the OECD (2009), inefficient fossil fuel subsidies encourage wasteful consumption. The OECD (2009), as reported in Burniaux, and Chateau (2011), argued that removing fossil fuel subsidies in a number of non-OECD countries could reduce world Greenhouse Gas (GHG) emissions by 10% in 2050. Burniaux and Chateau (2011) added that though removing subsidies could contribute to stabilizing greenhouse gas concentration, the full environmental benefit of the policy would better be achieved if efforts to minimize emission are also in place in OECD countries. The study concluded that on a global scale, removing fossil fuel subsidies could be considered as a global good. To the World Bank however, as stated in Amegashie (2006), though the removal of subsidies is one of its key policy

² Generating current or voltage by exposure to visible light or other electromagnetic radiation. PV systems do not directly depend on peak-oil and climate change issues, but on stable solar resources.

prescriptions to developing countries, the removal of subsidies could have adverse effects on the poor in these countries.

According to Amegashie (2006), Arrow and Debreu proved the existence of competitive prices under very restrictive conditions arguing that under certain conditions, a competitive equilibrium does not only exist but is also efficient: one that maximizes social welfare. Therefore, there would be no need for government intervention in such an economy since social welfare functions are maximized.

Amegashie (2006:8) further stated that:

“Suppose the cost per unit of output is constant, where cost is defined to include the minimum return on investment that an entrepreneur requires to remain in business. Since the quantity demanded of the commodity increases as the price falls, an increase in quantity beyond the competitive equilibrium quantity will result in a fall in the price. Given that the price is equal to the cost of production in a competitive equilibrium, any increase in quantity beyond the competitive equilibrium quantity implies that the price will be below the cost of production ... Conversely, any reduction below the competitive equilibrium quantity implies that the price is above the cost of production. But since price is a measure of how society or economic agents value a commodity, the value that society places on an additional quantity exceeds the cost. Therefore, economic welfare increases if quantity is increased when the economy is below the competitive equilibrium quantity. Thus, ... departures from the competitive equilibrium quantity and price reduce social welfare ... If the market is in a perfectly competitive equilibrium, then a subsidy, by reducing the price of the commodity, increases consumption of the commodity beyond the equilibrium competitive quantity. But since departures from the competitive equilibrium reduce social welfare, the subsidy is not desirable. Herein lies the logic behind the World Bank policy prescription: removal of subsidies. In this world, subsidies are a form of market distortion which leads to a misallocation of resources and a reduction in social welfare”.

But the conditions required for free markets to operate efficiently could rarely be met thus, it becomes questionable whether the benefits of subsidy removal could actually be realized when implemented in a developing country, Amegashie (2006) noted.

Stiglitz (1996) argued that market imperfections or distortions exist when buyers are uninformed, when the number of firms is small, when public goods exist, when property rights are weak, and so on. Stiglitz (1996) argued against subsidy removal from the premise that if subsidies are distortionary and reduces welfare in perfectly competitive markets then, they are necessarily so in markets which are not competitive as well. In another vain, Lipsey and Lancaster (1956) argued that in an economy characterized by many market imperfections, there is no guarantee that the removal of any one such imperfection will improve social welfare³.

On the second best theory, Amegashie (2006:10) illustrated that:

“Suppose there is a market imperfection, for example, there is only one firm or very few firms in the market. Typically, the equilibrium quantity in this market will be below the perfectly competitive equilibrium quantity. For example, the equilibrium quantity when the seller is a monopolist is lower relative to the quantity in a perfectly competitive market since monopolies charge higher prices. Therefore, a subsidy, by reducing the price of the commodity, may increase the consumption of the commodity towards the equilibrium (perfectly) competitive quantity, given that output was initially too low. Indeed, an appropriately chosen subsidy will move the economy towards the perfectly competitive equilibrium quantity. This increases social welfare”.

Amegashie (2006) also argued that subsidies may be used by governments to redistribute income from the rich to the poor and hence enhance economic performance. The study concluded that policies on subsidy removal should be implemented cautiously and be done on a case-by-case basis. However, the study did not consider the impact of subsidy removal from fuel and the implication of climate change.

³ This is the theory of second best. The theory suggests that if there are irremovable distortions in some sectors of the economy, then economic performance or social welfare may be higher if free-market pricing principles are deliberately violated in other sectors of the economy.

4. ANALYSIS OF FUEL SUBSIDY AND CLIMATE CHANGE

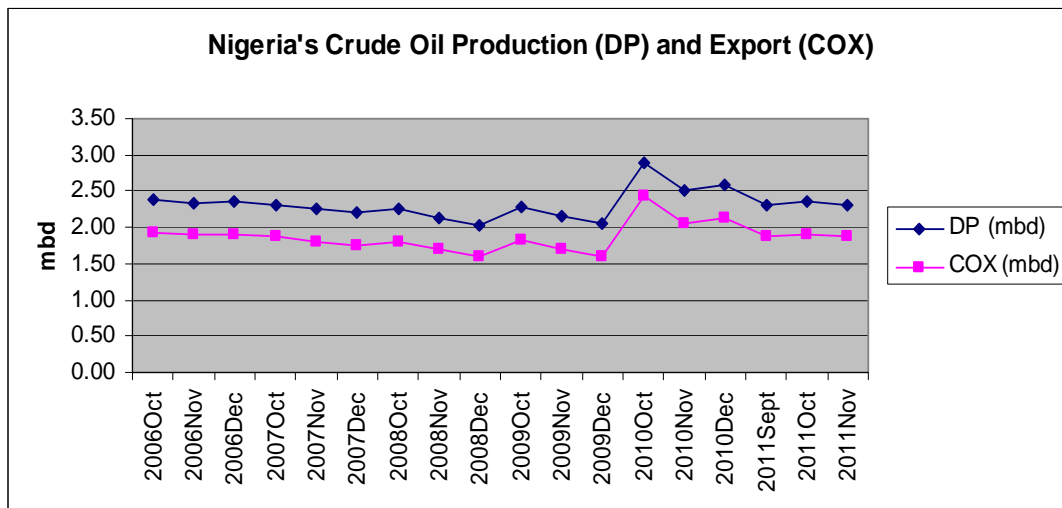
Nigeria relies heavily on crude oil for its foreign earnings and there are only few refineries in the crude oil market operating sub-optimally. According to the second best theory, the equilibrium quantity in such a market is below the perfectly competitive equilibrium quantity thus, firms would charge higher prices. Therefore, subsidy would increase the consumption of the commodity towards the equilibrium (perfectly) competitive quantity. It can be deduced from the second best theory that an appropriately chosen subsidy will move the economy towards the perfectly competitive equilibrium quantity. However, there is a floor with this theory.

The theory assumes that subsidy (on all goods) can move consumption to the perfectly competitive equilibrium quantity without looking at the individual or collective consequence of such consumption level and what kind of good is being consumed. It is from the perspective of subsidy induced fuel-consumption that this study seeks to make its normative analysis. The study argues in four major direction: (1) Fuel subsidy leads to high demand for oil which increases oil consumption and blurs the vision of a nation to consider alternative energy; (2) Fuel subsidy increases the demand for fuel over its local supply; (3) Fuel Subsidy Obscures alternative Energy Investment; and (4) High demand for oil increases the demand for fuel over its local supply and increases CO₂ emission.

(i) Fuel subsidy leads to high demand for oil which increases oil consumption and blurs the vision of a nation to consider alternative energy.

Nigeria's domestic crude oil consumption is rising and so does its crude oil export. Both trends simply show that, the demand for crude oil is on the rise globally and its consumption in Nigeria is increasing.

Figure 1



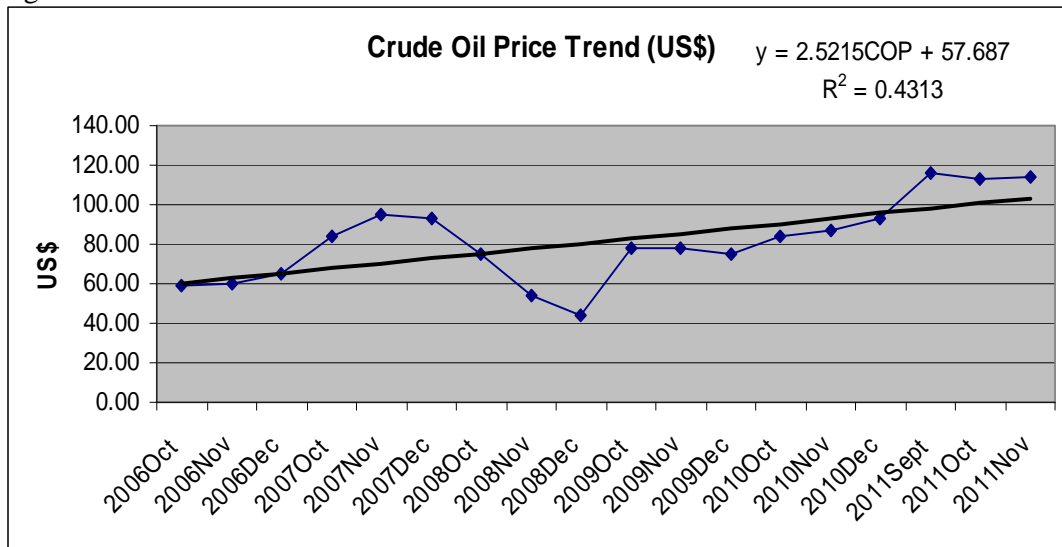
Source: Central Bank of Nigeria (CBN)

A nation that seeks to expand other energy sources or diversify other aspects of the economy but continue to subsidize fuel will only end up jeopardizing those sectors for which it seeks to expand or diversify into. Take agriculture for example. It can be said, that it is not the discovery of oil that led to the neglect of agricultural sector, but it is the introduction of fuel subsidy that made the oil sector a lazy place for investors to 'invest' given the 'cheap' profit they make compared to agriculture whose outputs did not enjoy comparable or no subsidy at all depending on the aspect of one's discussion.

(ii) Fuel subsidy increases the demand for fuel over its local supply

Fuel subsidy keeps the price of fuel below the market price. This means that the demand will over time, rise above its supply. This will then give rise to the need to import fuel to meet up local demand. While the government would import at internationally market determined price, it would need to subsidize the landing cost of fuel so that it will sell at the domestic regulated price not minding the fact that fuel price is on the increase at the international market (see Figure 2 below). This gives rise to deficit budgeting and leads to huge domestic debt. Since foreign currency (the USD) will be required to finance importation, the demand for the US dollar will increase hence leading to exchange rate devaluation, and lower the country's external reserve.

Figure 2



Source: CBN

(iii) Fuel Subsidy obscures alternative Energy Investment in Nigeria

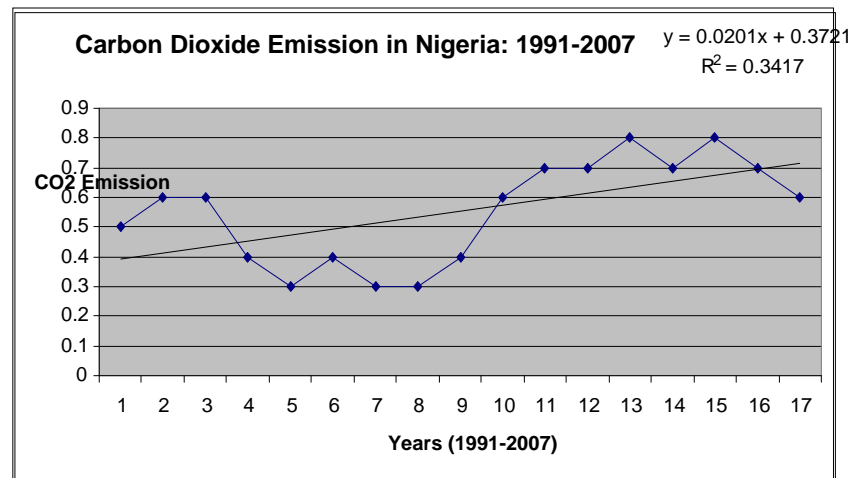
CO₂ emission has global consequences and developed countries that are adversely affected by climate change are taking steps to cut down reliance on non-renewable energy. Many countries in this category (the United States for instance), have been affected by the negative impacts of climate change. The US relies heavily on crude oil and with the role of renewable energy in aggravating climate change globally; the US is investing heavily on alternative energy so as to mitigate climate change impact and to arrest possible shocks that reduction in global crude oil supply could transmit to its economy. Thus, if the US cuts down its crude oil import, countries like Nigeria would initially suffer revenue loss but, would in the medium to long term seek to shift its export to countries like China with higher need for cheap energy. But the distance to transport crude oil to China is more than twice that of transporting to the US⁴ thus, Nigerian crude may need to be priced at a discount to go to the new market in China thus resulting in revenue loss. What is then important for Nigeria in the long run is to invest in alternative energy. But this option might not seem economically encouraging for investors since it would be cheaper to continue in non-renewable energy investment given that the sector enjoys huge subsidy. Thus, crude oil price should be allowed to reflect its real stance in the market to allow for a clear vision that supports alternative energy investment.

⁴ The voyage from the Bonny Terminal in Nigeria to Tianjin, China, is 12,172 miles, compared with 5,847 miles to New York Harbour.

(iv) High demand for oil increases the demand for fuel over its local supply and increases CO₂ emission

Due to the relative cheap price of fuel attributed to subsidy, fuel energy consumption increases. This is seen as more people use more cars/vehicles than they require and rely on generating sets which then contributes to CO₂ emission and causes climate change. The figure below shows that Nigeria's CO₂ emission is on the increase and cutting down future emission would be important not just for Nigeria but for Sub Sahara Africa as well.

Figure 3



Source: World Bank

With increased efforts by the World Trade Organization to encourage carbon friendly exports, countries that are not cutting down emission might in the nearest future be levied carbon-taxes on their exports. This would make their exports less competitive and have consequences for their external and domestic balance. Thus, taking actions that would cut down emission, discourage carbon related consumption and modes of production, and investing in alternative energy would all add up on the part of Nigeria to mitigate climate change and support sustainable growth and development.

5. SUMMARY AND CONCLUSION

Though the total withdrawal of fuel subsidy would make fuel expensive in the short to medium term and have diverse effect on the economy, the increase in its price, would put a limit on the demand for fuel as economic agents would be made to switch consumption patterns away from fuel by reducing the number of automobiles used, trekking certain distances or even cycling for instance. To address long distance transportation cost, railway systems that rely on alternative energy sources could be developed and cars/vehicles that are *climate change friendly* would replace non-climate change friendly automobiles, while solar panels would replace the use of generating sets that emit CO₂. The good news is that, while consumption patterns are being adjusted due to the withdrawal of fuel subsidy, the need for man to survive in the midst of rising prices would give rise to alternative (greener) modes of production that are non-fuel reliant. On the adjustment of consumption patterns however, policy on afforestation (especially in the rural areas) would however, need to be put in place or enforced to avoid a rapid switch to tree felling for energy: an anthropogenic act that could also aggravate climate change.

In conclusion, other countries are adjusting their consumption and production patterns away from fossil fuel. In the long run, the change in consumption and production modes in these countries, would affect Nigeria's crude oil demand. Thus, the earlier Nigerians start paying the right price for fuel the better because in the future, the government may accumulate unsustainable debt from subsidizing fuel leading to huge domestic and external debt, exchange rate devaluation and widen poverty gaps. On the international scene, the consequence of Nigeria's domestic fuel subsidy on the globe is increased CO₂ emission: something that will aggravate global climate change

especially in sub-Saharan Africa. But because the developed world especially, would have turned away from fossil fuel, Nigeria's foreign revenue would drop significantly. Furthermore, while the world is discussing how to cut down emission by 2050, countries that are not moving towards greener development (by adjusting consumption or production patterns), are likely to incur carbon tax on every export. This could affect economic partnership agreements and have consequences for Nigeria's external sector and over all development.

In summary, climate change is a crisis that by its very nature demands an international solution crafted in a spirit of co-operation. As stated by Gould (2010), without government action in Canada for instance, greenhouse gas emissions produced by Canadian cars will contribute to the flooding of people's homes in Indonesia. Likewise, without government action in Indonesia, the continued destruction of its forests will contribute to severe drought on the Canadian prairies. More than ever, in the face of climate change, Gould (2010) stated, the pursuit of national interests needs to take account of other nations' interests as well.

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