



RESEARCH ARTICLE

THE GREEN ECONOMY PARADIGM: HOW CAN NIGERIA MAKE THE SHIFT

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ABSTRACT

The notions of sustainable development and the green economy are inextricably linked, with just a thin line separating them. Looking at the definitions of two different concepts, for example, a green economy is defined by the Department of Environmental Affairs (DEA) as a system of economic activities related to the production, distribution, and consumption of goods and services that improves human well-being over time while avoiding significant environmental risks or ecological scarcities for future generations. However, the United Nations Environment Programme (UNEP), which inspired the GE, called for a Green Economy or, better yet, a Global Green New Deal (GGND). The GGND is a set of large-scale, internationally coordinated stimulus packages and policy actions that have the potential to expedite global economic recovery in the short term while also building the foundation for long-term sustained growth. It envisioned an economy devoted to healing the world's damage, one that thrived through the establishment of a slew of new firms

KEYWORDS

Sustainability, Development, Economic Growth, Efficacy

1. INTRODUCTION

The phenomenon of globalisation emerged in the period between the latter half of the nineteenth century and the early years of the twentieth century (1850–1914), and it tended to compel nations to behave in a way that portrayed as a cohesive geopolitical and socioeconomic organization (Kevin and Jeffrey, 1999). This increased activity in both technological and economic terms, resulting in massive expansion in the global economy, but at a cost. As a result, environmental concerns arose in the late twentieth century and have since grown to be a major source of international concern and activity (Guo and Ma, 2009). The world's emerging concerns of energy security, resource efficiency, global warming, and climate change are forcing it to shift to a green economy (GE) paradigm (UNEP, 2009b). In fact, GE has become a fashion statement (Huang, 2010). Interestingly, energy is at the heart of the problem, as the major source of greenhouse-gas emissions, and hence must be vital to the solution (IEA, 2009).

Similarly, as the world comes to grips with the triune obstacles of internationalization, climate change, and environmental degradation, the latter two being the direct consequence of petrified energy use as claimed previously, with countries transitioning to the GE, focus is now positioned on the use of non-fossil fuels (alternative renewable energy) because a transition to a low-carbon and more resource-efficient economy offers a promising avenue for economic and social development in Malaysia.

However, quick and sustained economic growth and poverty reduction require significant increases in the quantity, quality, and accessibility of infrastructure services, particularly electricity (Iwayemi, 2008b as cited in Adenikinju, 2005). Nigeria struggles to provide power at a rate of less than 5000MW per capita, resulting in low energy consumption per capita. According to the Nigerian energy industry is one of the most inefficient in the world at serving the needs of its consumers (Iwayemi, 2008a). Nigeria's desire for industrial, technological, and economical progress has been severely hampered by this scenario. As a result, Nigeria currently

faces the dual challenges of satisfying its energy needs using its substantial fossil fuel resources while also developing, acquiring, and deploying relevant Alternative Energy Technologies (AET) and Clean Energy Technologies (CET).

This study looks at the green economy in connection to global warming and climate change before presenting a strategic national energy guideline for creating an adequate integrated energy mix that would allow Nigeria to accomplish its energy goals while simultaneously addressing sustainability challenges. According to green growth policies could lead to major re-allocation of resources within and across broad economic sectors, hence Nigeria should take significant initiatives to drive development towards a greener path. This is especially true given that many governments' stimulus packages to address the recent global financial crisis in 2008 and 2009 already included a number of initiatives focused explicitly at greening the recovery. As a result, the following section of this paper clarifies the green economy's essential notion and others that are closely related to it. After that, there's a look at Nigeria's energy sector. The strategic policy framework will come next, which will give the country the flexibility it needs to transition to a green economy. In the conclusion, the report summarizes the important points and concludes with some recommendations for stakeholders.

2. CONCEPTUAL CLARIFICATIONS

Because certain phenomena associated with the huge production and consumption of fossil fuels are thought to have prompted calls for a transition to the GE. All burn fossil fuels carbon dioxide, according to some study and are an integral part of the Earth's lengthy carbon cycle (Freris and Infield, 2008). As a result, highlighting them here becomes necessary in order to bring the fundamental subject of this article (the green economy) closer to home. Global warming, climate change, sustainable development, and renewable energy are briefly explored here, despite the fact that they have become household terms, for the same reasons stated before. Global Warming and Climate Change According to global warming

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is defined as an increase in the average temperature on Earth, and the average temperature of the air at the Earth's surface has risen little under 1 degree Celsius (0.74 0.18°C, or 1.3 0.32° Fahrenheit) over the last 100 years (Allianz, 2007).

If the world continues on its current path, global temperatures are expected to rise by 6 degrees Celsius (OECD, 2009). Human actions are to blame for global warming. Greenhouse gases (GHG) are mostly discharged into the atmosphere as by-products of energy use. In fact, the energy sector is directly or indirectly responsible for about three-quarters of CO₂ emissions (OECD, 2009). GHGs include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (NO_x), hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride (SF₆), and other chlorofluorocarbons (CFCs). They are part of the Earth's atmosphere, trapping heat emitted by the sun and therefore warming the world through a process known as the greenhouse effect, which allows life to exist on the planet. As more than usual levels of GHG have been produced throughout the years, the same life-supporting greenhouse effect has now become a hazard to life.

"The costs of inactivity on climate change well outweigh the upheaval of the global financial crisis," a major climate change expert said in a Reuters report on October 27th, 2008, calling for additional fiscal spending targeted to low carbon growth. It went on to predict that if nothing is done about greenhouse gas emissions, which are responsible for global warming, the world will face economic hardship equivalent to the Great Depression (Hecht, 2008). Climate change has emerged as one of the most severe concerns facing humans and the natural environment, sparking disputes around the globe. Unfortunately, man's activities have resulted in erratic climate patterns across the planet over the last 50 years. The magnitude of the alterations cannot be compared to those that occurred over 1000 years ago.

We, as a people, cannot be ignored in this debate, as we may be a significant victim of climate change's terrible consequences, as predicted by scientists and environmentalists. According to a study, the clock is ticking inexorably toward doomsday, and even if we don't murder ourselves by poisoning the environment or warming the globe, it will eventually swallow all life (Hecht, 2008). As a result, all Earth's people should be extremely concerned. Although with the advancement of environmentally friendly technologies, greenhouse gas emissions are projected to increase by 45 percent by 2030, according to the OECD (2009), and yet, by 2050, nearly three-quarters of the world's energy supply will still come from fossil fuels; energy demand and GHG, especially CO₂ emissions, will almost double; and electricity usage will much more quadruple unless much further policy measures are implemented, according to a European Commission (EC) report (EC, 2006).

3. SUSTAINABLE DEVELOPMENT

Sustainable development has become the torch stone of modern development thinking and an overarching societal aim for all countries (Hoverstadt and Bowling, 2005; Fulai, 2010). It pervades public policy to address social, environmental, and economic development in ways that "meet the needs of the present without jeopardizing future generations' ability to meet their own needs," fundamentally redefining the development landscape from Gro Harlem Brundtland's introduction in 1987 to the present day (Borwankar et al., 2005). Sustainable development, which was first codified in the Rio Declaration nearly two decades ago, is a necessary precursor to green growth, or the green economy (OECD, 2010). Similarly, developing a green economy is inextricably linked to long-term development and achieving the Millennium Development Goals (Scanlon, 2010).

4. RENEWABLE ENERGY

Renewable energy (RE) is worth highlighting since it has the potential to make considerable contributions to both sustainable development and, by extension, the GE (Bubou and Ejim-Eze, 2010). After all, the green economy's entire premise is based on the use of renewable energy sources. Renewable energy sources, on the other hand, are defined by as energy sources that, when consumed, are restored through natural processes in a relatively short period of time (Ugwu, 2008). RE is derived from nearly endless sources. RE encompasses solar radiation that strikes the earth and the energy forms that arise from it, as well as energy derived from other natural factors such as gravity and the earth's rotation; other examples include water, geothermal energy, biomass, and so on (Rosen, 2009).

5. THE CONCEPT OF THE GREEN ECONOMY

Sustainable development and the green economy are tightly intertwined,

with only a thin line separating them. Looking at the definitions of two concepts, for example, a green economy is defined by the Department of Environmental Affairs (DEA) as "a system of economic activities related to the production, distribution, and consumption of goods and services that results in improved human well-being over the long term while not exposing future generations to significant environmental risks or ecological scarcities while not exposing future generations to significant environmental risks or ecological scarcities" (DEA, 2010).

However, the United Nations Environment Programme (UNEP) called for a Green Economy or, better still, a Global Green New Deal (GGND) when it first proposed the GE (UN, 2010). The Global Growth and Development Strategy (GGND) is a series of globally coordinated, large-scale stimulus packages and policy measures that have the ability to spur global economic recovery in the short term while laying the groundwork for long-term sustained growth (UNEP, 2009a). It envisioned an economy devoted to healing the world's damage, one that thrived through the establishment of a slew of new firms.

In the environmental realm, renewable energy, low-carbon goods, organic agriculture, sustainably managed fisheries and forests, and the power of creativity and invention all present prospects (UN, 2010). As a result, governments are encouraged to assist in the transition of their economies to a greener economy that creates green jobs, supports sustainable and equitable growth, and accomplishes the Millennium Development Goals (DEA, 2010). The green economy is a new economic pattern that emphasizes economic growth while also protecting the environment. It is the result of the demand that the industrial economy not harm human health or the environment, resulting in a new stage of social development. The GE is a road to long-term development that takes into account the interrelationship of economic growth, social security, and the natural ecology (Huang, 2010; DEA, 2010).

The goal of GE is to achieve economic and environmental harmony, convert environmental protection technologies, clean production processes, and all environmentally friendly technologies into productivity, and realize the economy's long-term development through environmentally friendly and non-confrontational economic activity (Huang, 2010). It also has the potential to boost productivity by promoting the adoption of sustainable production methods and consumption habits (particularly sustainable consumption and production processes) (Huang, 2010; DEA, 2010). In general, GE is about more economically using natural resources within the environment's carrying capacity for the benefit of everybody, with much lower GHG emissions (Cleantech, 2010, DEA, 2010).

As a consequence, the GE is characterized by substantially increased financing (both public and private) in green sectors, accompanied by facilitating new policies that provide processes for the realignment of businesses, infrastructure, and institutions, leading to a higher share of green sectors in the economy (in GDP terms), an increase in the availability and value of green sector jobs, and proper jobs; a decrease in energy/resource use per unit of production; and a decrease in the use of natural resources per unit of production (DEA, 2010; Scanlon, 2010). Above all, GE has far-reaching applications in nearly all key sectors of the economy, such as agriculture (going organic), energy (clean and alternative energy, smart grids, as well as energy efficiency), transportation (green transportation), tourism (green or eco-tourism), housing and urban renewal (green/smart cities and green buildings), green construction, environment and waste management, water and natural resources, marketing, industry and manufacturing, and policy research and governance (Huang, 2010; DEA, 2010; Scanlon, 2010; Roosa, 2007; UNEP, 2009a).

According to the United Nations (UN), developing countries like ours can gain experience by promoting pilot "poles of cleaner growth" like sustainable agriculture, clean energy, and leveraging renewable energy for sustainable rural development, which will likely result in a triple win: income development, job and income creation, and environmental conservation. This study focuses on the last two of the three GE poles supported by the UN. Because, just as adopting new "green" cleaner technologies and production processes is one-way organizations can reduce their carbon emissions, the rapid introduction of clean technologies is an essential part of creating a green economy, and luckily, clean technology is becoming less sophisticated and increasingly cheaper and readily available as a result of innovations (Bleda, 2010; Cleantech, 2010; Ugwu, 2008).

But, in order to ensure the flow of essential investment, the right institutional framework, policy consistency, adequate incentive structure, and investment security will be required (Iwayemi, 2008a). An important element of a green growth framework is to identify ways to redress or

prevent environmental damage collateral to growth, meaning the inclusion of all the sectors highlighted above (de Serres et al., 2010). However, the policy advocacy so far will emphasize the need for energy efficiency and the promotion of clean technology and clean and alternative energy use in the country, which is still in line with the green growth strategy. Lastly, the question this paper wishes to address is not just about providing sufficient capacity in electricity power generation, but about how Nigeria can generate this adequate capacity with the best climate mitigation options.

6. A SNAPSHOT OF THE ENERGY SECTOR

Nigeria is definitely a country rich in natural resources. According to a study, Nigeria has established oil reserves of approximately 23 billion barrels, natural gas reserves of 4293 billion m³ as of 1999, consisting of approximately 53 percent associated gas and 47 percent non-associated gas, coal and lignite reserves of 2.7 billion tons, tar sands reserves of 31 billion barrels of oil equivalent, and large scale hydroelectric power reserves of 10,000MW [see Table 1] below (Chendo, 2001).

Table 1: Nigeria's Conventional Energy Resources			
Resources	Reserve	Resources in Energy units (billion ton)	Total Conventional Energy (%)
Crude Oil	2.3 billion barrels	3.128	21.0
Natural Gas	4293 billion m ³	3.679	24.8
Coal & Lignite	2.7 billion tons	1.882	12.7
Tar Sands	31 billion barrels of oil equivalent	4.216	28.4
Hydropower	10,000 MW	1.954 (100 years)	13.1
Total	Conventional/Commercial Energy Resources	14.859	100%

Source: (Chendo, 2001)

Even a cursory examination of Nigeria's energy sector demonstrates that it is far from becoming a green economy. Despite having over five decades of experience in the petroleum industry, the government continues to openly flare gas, and the zero-gas-flare policy appears to have no end in sight, as the goal post continues to move backwards. This largely unrestricted gas flaring has consistently placed Nigeria among the world's largest sources of carbon emissions, which is a major contributor to global warming, then there's the monster of the widespread replacement of poor public electricity with highly subsidized private electricity (Iwayemi, 2008a; Iwayemi, 2008b). However, with proper planning and funding for the targeted sectors, whether petroleum products for transportation and industrial use or electricity/power generation, Nigeria may have been able to meet its energy needs totally from its vast petroleum reserves and other conventional sources. On the other side, the green economic paradigm downplays our reliance on fossil fuels.

As a result, the country should consider investing in renewable and alternative energy sources seriously. At the very least, look at cleaner energy technology as an option. Nigeria, fortunately, has a diverse range of renewable energy sources. Hydro resources, for example, are expected to be 14,750 Megawatts; solar radiation is estimated to be 3.5-7.0 Kilowatt-2 hours per day; and wind speed is 2.0-4.0. Blackouts and brownouts, a widespread reliance on self-generated electricity, and a clear energy infrastructure shortfall. In summary, Sambo (2005, as quoted in the World Energy Council, 1993) neatly classified Nigeria's key energy difficulties as inefficient energy use, inefficient and unreliable energy supply systems, and environmental concerns. Wind energy is estimated at 150,000 terajoules per year, biomass at 144 million tons per year, and wave and tidal energy at 150,000 TJ/(16.6 x 10⁶ ton/yr) (Iwayemi, 2008a, 2008b). The Energy Commission of Nigeria (ECN) has given Table 2 with information on Nigeria's renewable energy resources (2005). Nigeria, once again, has the potential to become a global leader in biodiesel if its potential is properly realized. Nigeria, which is the world's largest producer of cassava and palm oil, ranks third in the world for palm oil production after Malaysia and Indonesia (Bubou and Ejim-Eze, 2010; Omofonmwam and Odia, 2009).

Table 2: Nigeria's Renewable Energy Resources	
Energy Source	Capacity
Hydropower, large scale	10, 000MW
Hydropower, small scale	734MW
Fuelwood	13, 071,464 hectares (forest land 1981)
Animal waste	61 million tons/yr
Crop Residue	83 million tons/yr
Solar Radiation	3.5 – 7.0kWh/m ² -day
Wind	2 – 4m/s (annual average)

Source: (ECN, 2005)

Nigeria's low per capita energy consumption is due to the observed energy infrastructure gaps, the noted energy difficulties, and prior governments' lack of will and commitment. Nigeria generates barely 3500MW of power for its predicted 150 million inhabitants, compared to South Africa's approximately 50,000MW for a population of about 48 million people, as per today's figure. In 2004, per capita electricity usage in Nigeria was 140 kWh, compared to 1337 kWh in Egypt and 4560 kWh in South Africa, indicating a significant energy divide and poverty in the region (Iwayemi, 2008). Even the estimated \$262 billion investment in the power sector to increase capacity to over 30, 000 MW by 2030 will only be around 30% of South Africa's projected 100, 000 MW during the same period (Iwayemi, 2008).

Another aspect of the dilemma is the significant quantity of electricity wasted during transmission and distribution, which can equal to up to 30% of total electricity generated. Regulatory uncertainty in the energy sector has made progress more difficult in the past, particularly with renewable energy initiatives. The Nigerian Energy Regulatory Commission (NERC), the ECN, the Nigerian Atomic Energy Commission (NAEC), and the National Centre for Energy Research and Development are now all in place. As a result, it is envisaged that better coordination of activities and stronger relationships between these organizations and other associated institutions will aid in steering the nation's energy industry in the right direction.

7. GREEN GROWTH STRATEGIC POLICY FRAMEWORK

Energy investment and consumption decisions will be guided towards a low-carbon option depending on the policy and regulatory frameworks in place at the national and international levels (IEA, 2009). Public policy, on the other hand, is an important indicator of an energy efficient (smart) economy in moving towards a clean energy economy, and as such, public policies must be designed to advance the clean energy economy – from comprehensive energy plans, renewable energy standards, and energy efficiency measures, to job retraining and waste reduction efforts (The Pew Charitable Trusts, 2009). To get energy policy right, policymakers need to understand the elements that will affect energy demand and supply in the coming decades and plan ahead accordingly, one of which is the present worldwide trend toward GE (Lawson, 2010).

After discussing the phenomenon of the green economy and its relevance to Nigeria, a green growth strategic policy framework is proposed in order for Nigeria to transition to the green economy and reap the benefits that come with it. And, over the next two decades, such a strategy framework must aim to build an optimal energy supply balance, with an emphasis on reducing GHG emissions, growing renewable energy, and improving energy efficiency. Unfortunately, the current Nigerian educational system is prone to producing white-collar job seekers and blue-collar workers, necessitating calls for further investment in new "green employment."

Such calls should be backed up by investments in tertiary education sustainability programs and overall advances in science, technology, engineering, and mathematics education at all levels. It also implies that significant investments in energy research and development, as well as technology, will be necessary (Bubou and Ejim-Eze, 2010). Capacity building and institutional support for renewable energy design, planning,

marketing, and policy assessment will also be included (Byrne et al., 1998). An acceptable green growth strategy, according to the argument, must contain a forward-looking policy framework as well as a comprehensive energy strategy that includes an integrated resource plan for electricity and an energy-mix road map for the next two decades (UNEP, 2009a; UNEP, 2009b; DEA, 2010; Roosa, 2007; United Nations, 2010; UNEP, 2009a; UNEP, 2009b; DEA, 2010).

As a result, the strategic policy framework should incorporate the following critical elements:

Because energy efficiency is one of the most cost-effective approaches to reduce GHG emissions and is gaining popularity, it will need to be better recognized and integrated into energy policy (Hamilton, 2008; CEER, 2008). In this sense, Nigeria needs to develop a National Energy Efficiency Strategy that will lay the groundwork for an energy efficiency action plan, as well as define and standardize energy efficiency legislation.

Energy production and dispersion: To enhance Nigeria's energy security, particularly power, she will need a distributed energy mix, numerous stakeholders (such as more independent power plants, or "IPPs"), cogeneration, distributed generation based on sustainable, sustainable energy feed-in-tariff (Refit), and non-polluting sources of energy.

The strategic framework should aim to ensure that all stakeholders have a consistent concept of green growth, laying the groundwork for high-quality energy efficiency programs that promote local economic activity. It must also provide for the coordination and expansion of energy-efficiency educational initiatives, such as the distribution of publications, public education, and training classes, as well as seminars, conferences, and academic journals. Capacity building for people involved in energy-related R&D is also required, including the transfer of innovative technologies from other countries via joint ventures and international investment.

Collaborations/linkages: According to existing national renewable energy programs should be given long-term consideration (Roosa, 2007). As a result, a strategic framework should attempt to enable close coordination across organizations when it comes to delivering green economy operations. Government agencies such as the Energy Commission of Nigeria (ECN), the Nigeria Atomic Energy Commission (NAEC), and the Nigerian Electricity Regulatory Commission (NERC), as well as civil society organizations such as the Nigerian Society of Engineers (NSE), the Nigerian Environmental Society (NES), and the Nigerian Society of Architects (NSA), must be mobilized.

Markets and investments: Public and private investments in renewable energy are currently insufficient. As a result, the proposed strategic framework must make it easier for businesses to provide energy efficiency services, products, and processes, as well as assess potential green investment sectors such as cities and buildings, transportation, waste management, renewable energy, agriculture, forests, water, fisheries, tourism, and clean technology. In addition, incentives should be offered to encourage smart investments in the highly profitable green technology.

8. CONCLUSION

Nigeria must struggle with the concerns of global warming, greenhouse gas emissions, and climate change linked with burning fossil fuels as she fights to supply steady energy for her teeming population with the enormous natural resources she is gifted with. As a result, transitioning to a green economy is the only viable option for satisfying the country's diverse energy needs without jeopardizing issues of long-term sustainability. And, in the case of transit, public policy is a key indicator of that future. Such a comprehensive approach will eventually give a way to achieve the nation's seemingly difficult aim of adequate, high-quality, and reliable energy.

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