A Strategic Perspective on Nigeria's Role in Energy Cooperation and Integration in the Greater Gulf of Guinea

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Abstract

Africa is fairly endowed with significant energy resources that are unevenly distributed. Oil and gas reserves are concentrated in North Africa and the Gulf of Guinea; hydropower potentials are concentrated in Central and Eastern Africa, and vast coal deposits exist in Southern Africa. The patterns of energy production and consumption in Africa however show that although Africa produced an estimated 12% of world total oil supply, the continent consumed only about 3.4% of world consumption. These patterns show low level of electricity consumption, limited access to modern energy supplies, significant household sector consumption of energy, and heavy reliance on biomass fuels for domestic energy needs. Africa has key concerns of accelerated development and poverty reduction; and the access to clean reliable energy is expected to play a vital role in meeting these challenges. Continental energy initiatives are regional based, with limited interconnectivity between regions. The Greater Gulf of Guinea has become an important geopolitical factor in the global energy security dynamics and will receive in excess of $200 billion in investments and benefits over the next two decades. This paper takes a look at this critical region and examines the role of Nigeria in promoting energy cooperation and integration in this non-traditional regional Information was sourced from secondary data only. This involves the content analyses of books, journals and previous research works on the energy industry in Africa. An analysis of energy production and consumption trends in this area showed significant dependence on biomass fuels for energy requirements. Factors affecting energy cooperation and integration in the region were found to include markets, international development policies, international environmental pressures, economic development pressure, geography and population distribution, safety and security, human, institutional and financial capacity, governance, technical specifications compatibility, and synergetic structures.

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Introduction

Africa is the world's second largest continent covering 23% of the world's total land mass, containing 13% of the world's population, and producing 7% of global commercial energy. Africa, however, is also the poorest continent, accounting for only 2% of the world's Gross Domestic Product (GDP) and only 3% of global commercial energy consumption (Beacon and Matter, 2005). There are 53 different African countries, divided into 5 distinct regions – North, West, Central, East and Southern Africa, and most of these countries are extremely poor. It is recognised that most of the commercial energy Africa produces is exported to foreign countries while the local populations have to rely on traditional sources of wood fuel and animal waste (Akarakiri, 2005). The two primary sources of energy in Africa, fossil fuels and biomass, on the average, account for 97.8% of total energy consumption each year (Fossil fuels account for 52% of total energy consumption in Africa, biomass 46%, Hydroelectricity 1.2%, and nuclear energy 1%). Average yearly growth rates have been estimated to be 5.78 million toe for fossil fuels, 3.6 million for biomass, 0.31 million toe for hydroelectricity and 0.09 million for nuclear power (Ogundari, 2006).

Africa has key concerns of accelerated development and poverty reduction; and the access to clean reliable energy is expected to play a vital role in meeting these challenges (AOPIG, 2002). Traditionally, African energy planning and development is restricted within national boundaries and although Africa possesses adequate energy resources for her development, energy production is not evenly distributed. Oil and gas are concentrated in North and West Africa, hydroelectric potential in Central and East Africa and coal in Southern Africa. It is this pattern of distribution and energy use that underlies the case for regional, and ultimately continent-wide, integration of energy development as most African countries rely on importation of fuels (especially petroleum) and the high costs have had negative impacts on their economies (AOPIG, 2002; Davidson, 2002; Davidson, 2004).

Cross-border energy supply often provides greatly enhanced diversification of energy source – a key component of energy security. Less tangibly, but importantly, joint energy project development can help build closer ties between countries through closer collaboration and increased inter-dependence (Hoffman, 2001; Jaffe and Victor, 2004). The broadening of energy markets across national boundaries, or the so-called integration of energy markets, has been happening at various rates in different parts of the world. For

example, Western Europe inter-connected its electricity grids shortly after the Second World War, and more recently the European Commission has sought to create genuinely pan-West European electricity and gas markets in order to capture the benefits therein (Morse and Jaffe, 2001; Kalashnikov, 2004).

In Africa the transition to integrated energy systems are primarily sub-regionally based – oil, gas and electricity infrastructure linkage across northern Africa; electricity markets linkage in southern Africa; and the emerging West African integrated energy system. Africa has only begun to reap the benefits potentially available from integrated energy development as full integration of energy systems is a very long-term task (Davidson, 2004).

Preliminary investigations into African energy forecasts have shown comparisons in regional energy consumption patterns (Figs 1-4) (Ogundari, 2007). Southern Africa, North Africa and West Africa are recognised poles of leadership by these analyses. Southern Africa, North Africa and West Africa are the three largest consumers of energy in Africa and they also have the largest annual growth rates. Not only is the Southern Africa region the largest consumer of total energy in Africa (Fig 1), it also leads in commercial energy consumption (Fig 2), and energy consumption per capita – both total and commercial (Figs 3 and 4).

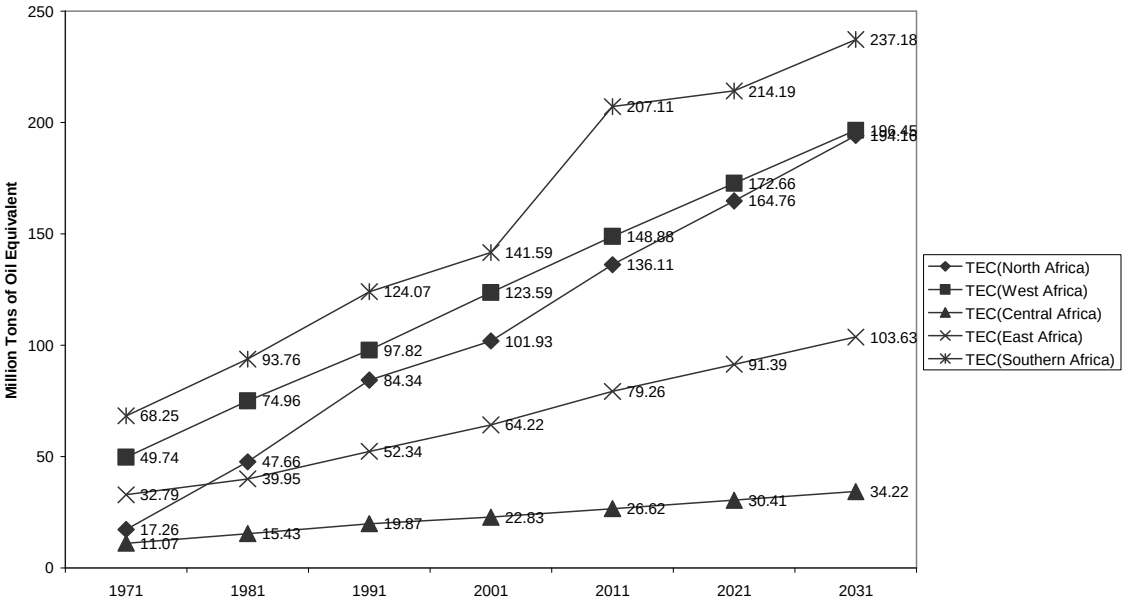

Fig 1: Total Energy Consumption – Africa
Source: Ogundari (2007)

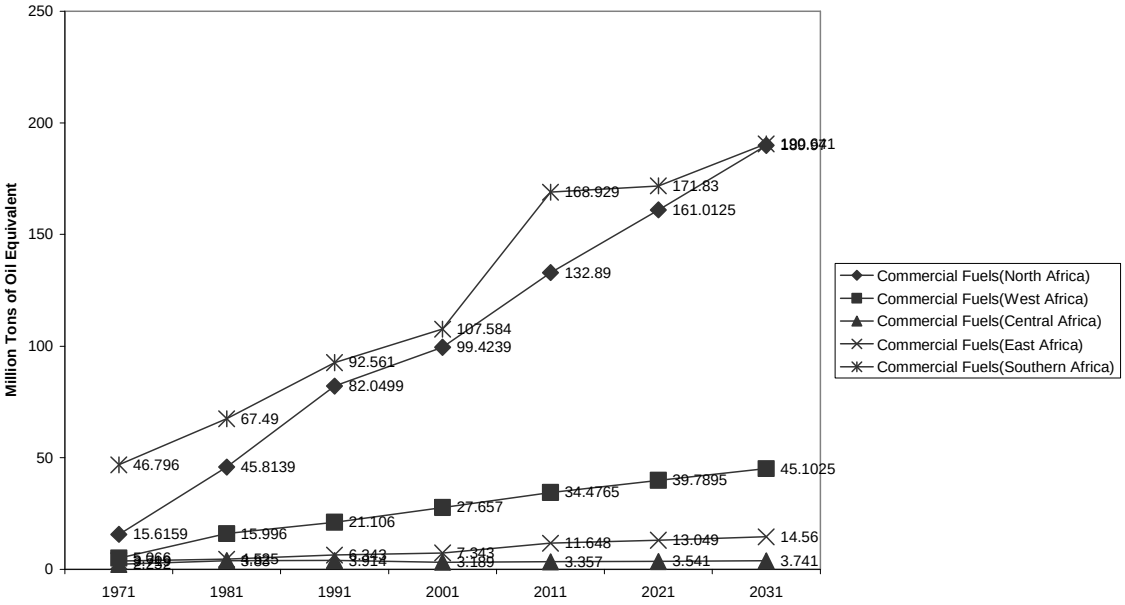

Fig 2: Commercial Energy Consumption – African Regions
Source: Ogundari (2007)

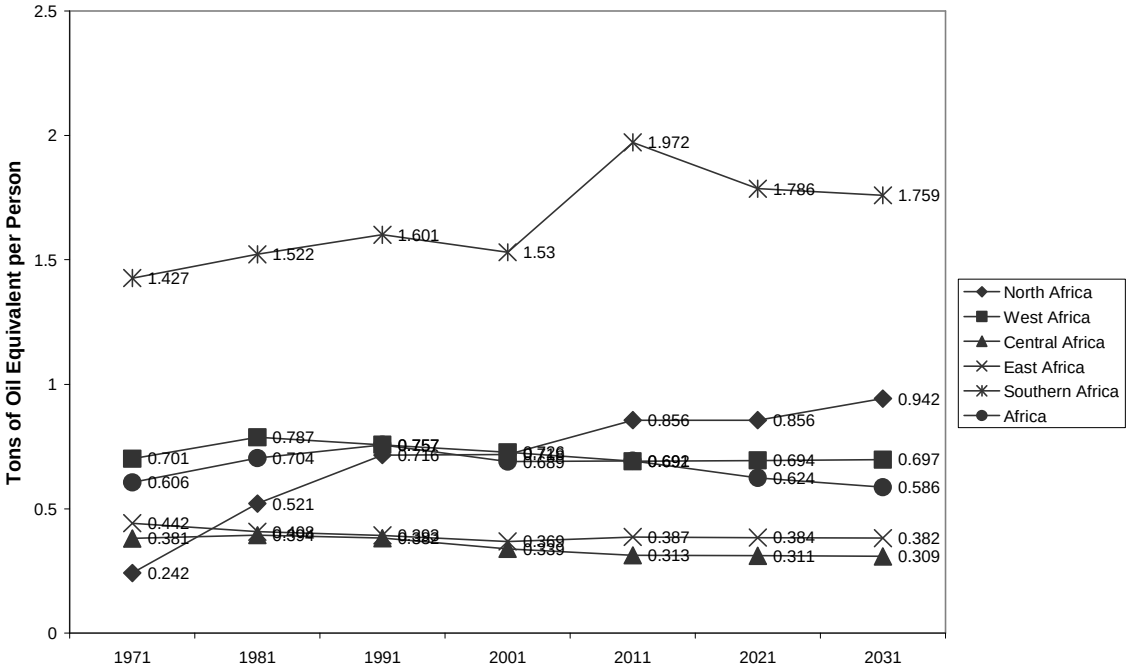

Fig 3: Total Energy Consumption per Capita
Source: Ogundari (2007)

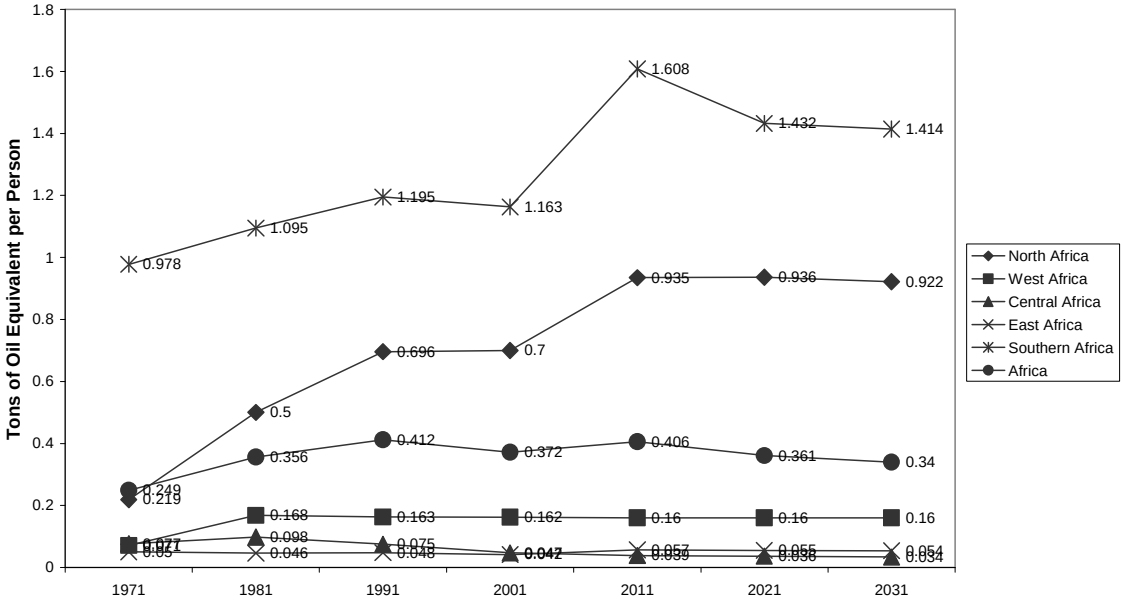

Fig 4: Commercial Energy Consumption per Capita
Source: Ogundari (2007)

1. Regional Integrated Energy Projects in Africa

The primary focus on integrated energy collaboration was regional, and the most integrated energy networks in Africa are located in the Southern and Northern parts of the continent (See Table 1). This could be attributed to the long-term implications of Western influence or the similarity and homogeneity of area- or regional culture; for instance, the North African region is reasonably well integrated because majority of the people in the region live in a relatively narrow strip along the Mediterranean coastline and along the Nile River with strong socio-economic indicators and high energy self-sufficiency capability (Ogundari, 2007). The outlook for this region is to be a ready source of energy for the European market.

Over the last few years, there have been efforts to create inter-regional integrated energy networks – the North Africa-West Africa project and the North-Central- East Africa and East-Southern Africa being examples. However, these projects have mostly stagnated at the proposal and planning stages (NEPAD, 2005). Africa's new development blue-print, the New Partnership for Africa's Development (NEPAD), clearly recognizes the need for the integration of energy development to meeting and sustaining the regional economic development agenda and fostering greater political unity, hence in 2002, the

African Union agreed to establish the African Energy Commission (AFREC) to provide the basis for pan-African energy planning and analysis (Roberts, 2004).

Table 1: Energy Cooperation and Integration Initiatives in Africa

Region	Status	Major Projects
North Africa	Reasonably well integrated. Second most integrative in Africa.	Egypt-Libya-Tunisia-Algeria-Morocco electricity grids and gas/oil/petroleum pipelines
West Africa	Limited integration. Projects at proposal and planning stages. Rated 4th in Africa	West Africa Gas Pipeline (GAGP); West Africa Power Pool (WAPP).
North and West Africa (inter-regional)	Trans-Saharan Gas Pipeline (Nigeria-Algeria: NIGAL) at proposal and planning stages	NIGAL
East Africa	Significant integration. EAPM Plan in early development stages Rated 3rd in Africa	East Africa Power Master (EAPM) Plan
North, Central and East Africa. East and Southern Africa (inter-regional)	Opportunities for integration identified for Investigation.	Nile Basin Initiative East-Southern Africa Power Pool (SAPP) Integration
Central Africa	Limited integration. Fewer interconnections than any other region.	Chad-Cameroon Oil Pipeline Inga Project
Southern Africa	Well-established integration. Most integrative energy network in Africa.	Southern Africa Power Pool (SAPP)

(Source: Ogundari, 2007)

2. The Greater Gulf of Guinea Perspective

A strategic area for energy cooperation and integration in Africa is the Gulf of Guinea region. This area has a market size of about 300 million consumers encompassing a large number of countries from West and Central Africa: Angola, Benin, Cameroon, Côte d'Ivoire, the Democratic Republic of Congo (DRC), Equatorial Guinea, Gabon, Ghana, Nigeria, Republic of Congo, São Tomé and Príncipe, Chad, and Togo. These countries enjoy wide geological, geographical, and cultural diversities. They range from English-speaking countries to French-, Portuguese-, and Spanish-speaking nations. Overall, the

Gulf of Guinea generates a GDP of $112 billion, exports of about $45.5 billion and imports of about $31.63 billion (Goldwyn and Morrison, 2005). The area is also endowed with vast oil reserves. The geographical position of the Gulf of Guinea represents an important comparative advantage for oil supply to the world. The Gulf of Guinea benefits from the absence of narrow shipping maritime lanes known as chokepoints, between the region and the world's main consumers of energy – North America and Western Europe – and is relatively close to these markets. Likewise, its geographical closeness to Western Europe relative to the Middle East and Asia adds to the region's comparative advantage for the movement of goods and people, through reduced costs of sea transportation (Goldwyn and Morrison, 2005; Lovins, 2003).

The Gulf of Guinea has become an important geopolitical factor in the global energy security dynamics. With the tremendous changes in the global economy, the robust economic growth in China and India, and the current political climate in the Middle East which has disruptive effects on oil prices and causes shifts in the structure of oil demand, the region occupies a very important place in the United States, European and Asian energy strategies. For instance, it is expected that the area will receive a significant portion of the almost $250 billion worth of foreign investments and benefits for Africa continent are expected by 2015 (Randall, 2002; Robert, 2004). The United States alone will invest more than $10 billion a year in the region over the next 10 years in oil activities, ecological and oceanic research, military support and discrete political interventions. The production of oil and natural gas in the Gulf of Guinea has the potential to fulfill the United States' and Europe's excess demand for energy bearing in mind their desire to diversify their sources of energy supply so as to reduce the risks associated with high dependence on Middle Eastern oil (Goldwyn and Morrison, 2005; Lovins, 2003; Robert, 2004).

With such huge opportunities, it is logical for the Gulf of Guinea's States to create a strategic alliance with the aim of promoting energy cooperation and integration on the continent. This alliance would entail collaboration between oil-producing states in West and Central Africa as a powerful kick–start for energy security in Africa. Reality however shows that creating this 'strategic alliance' could be complicated; a preliminary forecasting analysis of energy consumption by source by an integrated Greater Gulf of Guinea over a 60-year period shows the high dependence of countries in the region on biomass renewable (see Fig 5). Average biomass energy consumption growth is estimated to be 2.2 million toe per year. This is comparable to an average growth rate of

0.62 million toe per year for fossil fuels and 0.08 million toe per year for hydroelectricity. A significant 79% of energy consumption in the Gulf of Guinea region will come from traditional biomass (non-commercial energy sources). Furthermore, the region is vulnerability to instability and disruption – a function of malgovernance and corruption, weak state structures, limited regional integration (especially in the maritime sphere), large geographical spread, high economic depression, weak independent civil society groups, limited technical capability and infrastructure development, and uncertainty in the future succession of several autocratic governments. This is in contrast to the world's other fast growth, offshore energy zones – Brazil, the Caspian, and the U.S. Gulf of Mexico (Goldwyn and Morrison, 2005). Table 2 gives a profile demographic and wealth indicators of the states in the Gulf of Guinea.

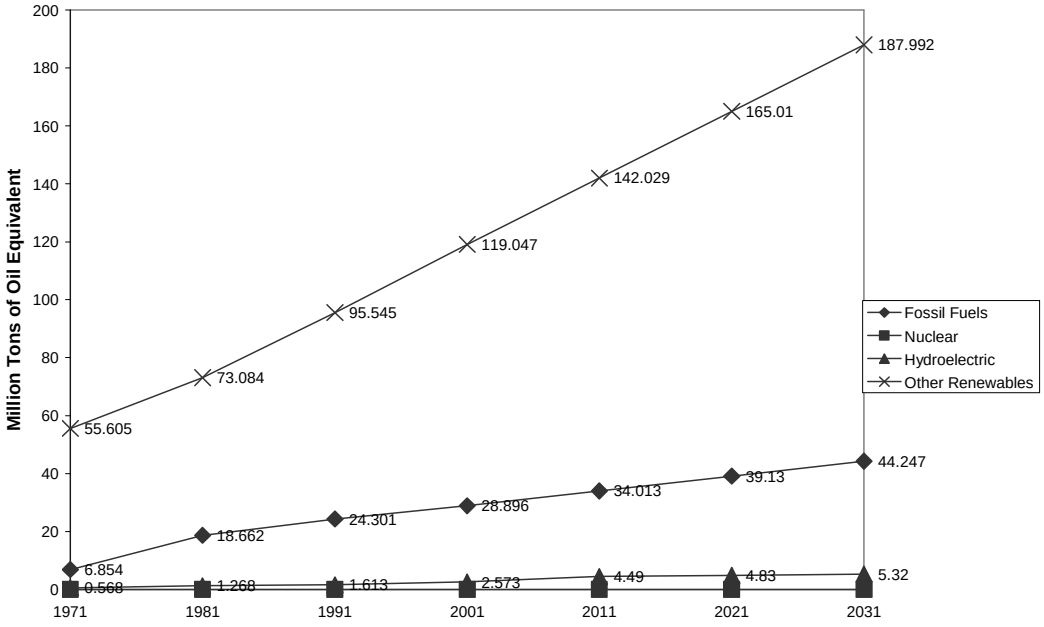

Fig 5: Energy Consumption by Source: Gulf Guinea
Source: Ogundari (2007)

Table 2: Population and Wealth Indicators of Gulf of Guinea Countries (2007)

Country	Land Mass (Million Sq km)	Pop (Mil)	Urban Pop Distr. (%)	GDP US $ billion	GDP/ capita US $	Post-Secondary Education*	HDI	Energy % of national Income
Angola	1.25	12.3	37	33	2,058	12,300	0.445	99
Benin	0.11	8.1	46	4.3	508	8,100	0.431	0
Cameroon	0.48	18.1	53	17	1,033	36,200	0.497	67
Chad	1.28	10.2	26	5.5	561	6,120	0.341	40
Congo Rep	0.34	3.8	54	5.1	1,273	15,200	0.512	90
Cote d'Ivoire	0.32	18.1	46	16	900	144,800	0.42	0
DRC	2.34	64.6	33	7.1	123.4	64,600	0.385	0
Eq. Guinea	0.03	0.6	48	3.2	6,415.9	600	0.655	30
Gabon	0.27	1.5	85	8.1	5,821.1	12,000	0.635	95
Ghana	0.24	22.9	46	11	484.8	183,200	0.52	0
Nigeria	0.92	135.1	48	99	752.3	1,756,300^	0.435	93
Sao Tome & Principe	0.001	0.2	38	0.07	450.9	NA	NA	NA
Togo	0.06	5.7	36	2.2	358.5	5,700	0.512	0

*** Post Secondary Education**

^ University Degree Holders

Source: Ogundari (2007)

3. An Integrated Energy System in the Gulf of Guinea

Strategic analysis of integrated energy system development in the Gulf region requires a proper understanding of commercial energy production and consumption data from the region. Nigeria is the clear leader in commercial energy reserves, production and consumption in the region with Angola in second position (see Tables 3 and 4). The thrust of an integrated energy system in this region could involve: (i) the networking of existing energy production capacity in the region, (ii) the development of new integrated energy infrastructure, and (iii) the development of a robust system for off-shore oil and gas development. The foreign direct investment (FDI) in the area will favour the third option as it would support energy production for the US, EU and Asian markets.

Table 3: Energy Production Gulf of Guinea States (2007)

Country	Crude Oil Reserves (Mil Barrels)	Crude Oil Production (tbpd)	Natural Gas Reserves (Bil cubc ft)	Natural Gas Production (Bil cubc ft)	Coal Reserves (Mmst)	Coal Production (Mmst)	Electricity Production (BilkWHr)
Angola	5,400	1,244.8	1,600	30	0	0	1.9
Benin	8.2	0	40	0	0	0	0.07
Cameroon	400	60	3,900	0	0	0	2.89
Chad	900	250	0	0	0	0	0.12
Congo Rep	1,500	226.9	3,200	0	0	0	0.34
Cote d'Ivoire	100	53.8	1,000	46	0	0	5.1
DRC	187	21.1	35	0	0	0	6.04
Eq. Guinea	1,765	355.3	1,300	44.9	0	0	30
Gabon	2,500	233	1,200	3.2	0	0	1.5
Ghana	16.5	6	840	0	0	0	5.36
Nigeria	35,900	2,628.4	184,700	752.3	209.4	0.1	15.6
Sao Tome & Principe	NA	NA	NA	NA	NA	NA	NA
Togo	0	0	0	0	0	0	0.17

Source: Ogundari (2007)

Table 4: Energy Consumption Data of Gulf of Guinea Countries

Country	Crude Oil (tbpd)	Natural Gas (Bil cubc ft)	Refining Cap (tbpd)	Coal (Mmst)	Electricity BilkWHr
Angola	58.1	25.4	39	0	1.8
Benin	14	0	0	0	0.54
Cameroon	23	0	0	0	2.79
Chad	2	0	0	0	0.11
Congo Rep	5.3	0	21	0	0.62
Cote d'Ivoire	17.7	46	65.3	0	3.4
DRC	7	0	0	0	4.32
Eq. Guinea	1.3	44.9	0	0	30
Gabon	10.7	3.2	17.3	0	1.4
Ghana	45	0	45	0	5.08
Nigeria	319.3	261.7	438.8	0.1	14.5
Sao Tome & Principe	NA	NA	NA	NA	NA
Togo	11	0	0	0	0.65

Source: Ogundari, 2007

Networking existing energy projects across the region would entail linking the energy projects in West Africa to those of Central Africa. This would be difficult because Central Africa has fewer interconnections (electric and pipelines) than any other region in Africa. There are many factors causing this: the thick African rain forests where these countries are present, the low population density, wars and civil strife, poverty and ignorance, and bad governance. West Africa has proposed the West African Power Pool (WAPP) and The West African Gas Pipeline (WAGP) projects, while in Central Africa; connections include the (major) Chad-Cameroon oil pipeline, minor electric interconnections between Democratic Republic of Congo (DRC) and Congo Republic, DRC and Angola. Building new energy projects in the region faces the daunting challenge of raising finances and the limited technical capability in these states.

4. Factors Affecting Energy Cooperation and Integration in the Gulf of Guinea

Some key factors affecting regional energy cooperation and integration are:

i. **Markets:** African energy cooperation and integration projects are more pronounced in areas where there is a significant market they can serve. For the Gulf region, easy access to the American, European and Asian energy markets could serve as the spur for cooperation projects. The ready market for petroleum products in the Gulf could serve as the incentive for the development of the oil industry. In contrast the weak gas, coal and electricity markets could limit development in these areas. The non-availability of a ready market in the Central African region is a factor limiting energy integration projects in the region.

ii. **International Development Policy:** The Gulf countries have been recipients of international development aid since political independence and yet they still rank low on the Global Human Development Index (HDI). The aid policies have therefore not been suitable to development aspirations. The general policy preference of the industrialised countries for the restructuring of energy sectors and their privatisation actually reduced official development funding for energy projects in developing countries – impacting negatively on the Gulf region.

iii. **International Environmental Pressures:** International environmental groups are placing considerable amount of pressure on the Gulf states to limit their energy integrations projects – especially the off-shore projects - in order as to "preserve" the environment; even though these projects are deemed necessary to spur economic development.

iv. **Economic Development Pressure:** The Gulf states are economically poor with their major occupation being subsistence farming. There are competing demands to spend limited funds on economic development programmes or energy integration projects. Political considerations make it imperative for Gulf countries to put energy projects on hold in support of economic development projects.

v. **Geography and Population Distribution:** There are many physical impediments to energy integration in the Gulf. These features come into play because the area is large with huge variations in topography and vegetation. The large area, extreme low population density, and thick rain forests, makes it difficult to interconnect energy systems – raising issues of economic viability of energy projects. Furthermore, the bulk of the African population is rural and the people live in small

villages or farming homesteads scattered over a wide area. This poor, rural lifestyle may explain while the preferred energy source in Africa is biomass.

vi. **Safety and Security:** The prevalent political tensions among Gulf States do not aid energy integration projects. Security is very important and necessary for energy integration to take place. Issues of national domination of regional energy integration projects and consequent international disputes create concern for cooperation and integration schemes. More often than not, political considerations take precedence over cheap energy supply. For instance, there have been maritime disputes between Nigeria and Sao Tome and Principe over off-shore oil deposits. Physical security is also important. Pipeline vandalisation in Nigeria does not improve the efforts of the WAPP and WAGP but rather pushes other Gulf countries in the agreements to develop alternative sources of energy. Poor maintenance of existing grids and pipelines also contribute to insecurity situations in the region, as well as border and ethnic clashes.

vii. **Governance:** A critical factor is the quality of governance available in Gulf States. Almost 60 years of political independence by these countries has raised up poor quality of governments ranging from military despots to civilian autocrats and disastrous one-party and one-man rule. With the advent of democratic administrations and the establishment of the African Union and the New Partnership for Africa's Development (NEPAD) it is expected that a better quality of governance and leadership will foster rapid cooperation and integration in the energy sector.

viii. **Human, Institutional and Financial Capacity:** Developing sound energy and socio-economic policies are useless if it is impossible to use them. The region suffers from inadequate human, institutional and financial capacity, contributing to the quality of governance experienced in the area and limiting the capacity for effective development and implementation of government policy. The lack of human capacity tends to result in the centralization of technical expertise in an attempt to get the greatest value out of a scarce resource. This centralization however has the tendency to focus energy planning within natural boundaries rather than having an international energy cooperation perspective and in the cases where the cooperation agreements do come into place, stretch the available expertise beyond its elastic limits, with people trying to handle far greater and more diverse tasks than they would in other continents. Related to this is the inability of African

countries to build sound infrastructure that can handle development in the energy sector. These infrastructures include appropriate institutional and regulatory framework, viable legal institutions to handle energy laws, regulations, business agreements and rights, the implementation of projects and smooth operation of energy infrastructure. Another major facet of human and institutional capacity challenges in Africa is plant maintenance. With low HDI, Gulf states find it difficult to maintain the infrastructure bequeathed to them by their colonial masters. Major problems are lack of trained and/or experienced manpower, low organizational ability the dearth of maintenance funds. Infrastructural non-capacity is exhibited in the poor energy transportation and distribution systems – the roads, rail network, grids and pipelines.

ix. **Technical Specification Compatibility:** The Gulf States follow the technical energy specifications of their colonial masters and this stifles energy cooperation initiatives in the region. Greater efficiency can be achieved in regional electricity trading, refining and petroleum products trading if technical specifications can be harmonised.

5. Nigeria and Energy Cooperation and Integration in the Greater Gulf of Guinea

Different countries play key roles, or have the potential to play key roles in energy cooperation and integration in the Gulf of Guinea region. Angola is the second largest producer of oil in the region, and with the end of its civil war, the country can play a decisive role in regional energy development. Equatorial Guinea can also play a decisive role, as the country is the third largest producer of oil in the region. Other significant players would include Ghana, with its capacity for hydroelectricity development and integration, and Cameroon which plays a vital role in regional energy development by serving as a conduit pipe for oil from Chad. The DRC also has huge potentials for regional energy integration via developing the enormous hydropower potential of the Congo River especially at Inga. Bearing in mind that competition for influence in the region in intense, with regional, African and global interests at play, it is important to examine Nigeria's capacity for regional leadership.

Nigeria is the most pivotal nation to integrated energy systems development in the Greater Gulf of Guinea. No progress can be made to better integrate the region's energy systems, or improve its energy governance and security cooperation unless the Nigerian government is prepared to lead, in earnest and on a sustained basis. Statistics show that Nigeria accounts for about 45% of the population, 12% of the land mass, about 65% of urban population distribution, 47% of GDP, 70% of Post secondary education personnel, 74% of oil reserves, 52% of oil production, 63% of oil consumption, 93% of gas reserves, 86% of gas production , 69% of gas consumption, % of coal reserves, production and consumption; 23 % of electricity production, and 22% of electricity consumption (Ogundari, 2007). Nigeria is the most important destination for the estimated $250 billion in international investment in the region over the next decade (Goldwyn and Morrison, 2005; Lovins, 2003; Robert, 2004).

Nigeria also currently accounts for about 10% of US oil imports – with this expected to rise significantly in coming years (Akarakiri, 2005). Geographically, Nigeria occupies a vantage area in the curve of the Gulf region, placing the country almost in the centre of the region. Nigeria also has a comparatively huge number of educated population, and an almost 50-years experience in oil and gas production, exerting significant influence on regional energy dynamics (Akinbami, 2004). The fate of Nigeria therefore has the greatest impact on the energy integration in the Gulf of Guinea region.

Conclusions and Policy Perspectives

The desire for development in Africa has made it imperative to develop integrated energy systems across the continent for the provision of clean sources of energy. These energy cooperation initiatives have primarily been based in the existing geopolitical regions in the continent. Proposals for cross regional initiatives have not been able to leave the planning stage. The Greater Gulf of Guinea region is a non-traditional regional bloc on the continent; this region however plays a strategic role in global energy supply, and is expected to receive a significant portion of the over $200 billion in investments and benefits in Africa over the next couple of decades. This leadership role thrust on the region makes it imperative for the development of a robust Gulf of Guinea integrated energy system to benefit from the vast opportunities therein. This paper has shown demographic, economic and energy production and supply indicators in the region the relationship between the states in the region relative to each other. It has also provided a forecast on commercial and non-commercial energy consumption in the region. In this paper, it is clear that Nigeria has pivotal roles in the development of the regional energy system. Finally, factors that might affect the development of this system have been highlighted.

Trans-regional integration of energy systems in Africa is a late-1990s, early-2000s initiative; the establishment of the African Energy Commission (AFREC) by the African Union to provide the basis for pan-African energy planning and analysis happened in 2002 (Roberts, 2004). The development of a robust Gulf of Guinea integrated energy system would require a strategic plan of action that could also reduce the region's dependence on non-commercial energy and stimulate socio-economic development in the best cost-effective manner. Possible steps are highlighted below:

i. Articulate a clear vision for the region's energy future and recognise a pressing need for a transition for energy systems that are cleaner, more secure, and more sustainable.
ii. Facilitate the integration of the region's national energy policies. Since African energy consumption starts from within national boundaries, each country should develop a national energy policy within the framework of a regional initiative to streamline energy consumption trends. These include appropriate laws, treaties and agency directives. Nigeria should lead the way in incorporating experts from the different regions and countries to articulate this Pan-Gulf of Guinea energy policy.

ii. Energy cooperation and integration schemes in Africa should be focused on improving the lot of Africans, too often energy cooperation schemes are developed for the financial gain of the governments (e.g. the Nigeria-Algeria gas pipeline project) rather than the socio-economic well-being of Africans.
iii. Developing robust regional energy infrastructure systems could promote technological innovations in the energy sector that will enhance environmental sustainability. Issues of clean coal, carbon sequestration technologies, and innovations in energy storage and end use may be looked into.
iv. Nigeria should lead the development of a robust alternative energy economy in the region. It is important to note that region does not have any significant solar power contribution to its energy consumption pattern, yet the area is a solar-rich zone. Furthermore, despite the fact that biomass is responsible for a staggering 79% of Gulf of Guinea energy demand; there is no significant commercial biofuel industry anywhere in the region. This is losing focus on a critical alternative energy options for the region.
v. Nigeria should lead awareness campaigns on the security implications of regional dependence on non-commercial energy sources of energy. This should stimulate interests in the necessary changes required for energy use transformation. This is necessary because changes can be painful and the people have to be prepared for it.
vi. Nigeria should lead the development of technical capability in the region and reduce the dependence on foreign capital and expertise in energy exploitation.
vii. More research should be conducted on energy management in the region. This will provide policy makers in Africa with appropriate insights and findings to serve as guides in energy issues.

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