
Green Deal
Nigeria

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table of contents

Abbreviations

AG	Associated gas
ATAP	Agriculture Transformation Action Plan
bbl	Barrel of crude oil
bcf	Billion cubic feet
boe	Barrel of oil equivalent
CBN	Central Bank of Nigeria
DPR	Department of Petroleum Resources
EIA	Energy Information Administration (USA)
EPSRA	Electric Power Sector Reform Act
FDP	Field Development Plan
FIRS	Federal Inland Revenue Service
FiT	Feed-In Tariff
FMF	Federal Ministry of Finance
GHG	Greenhouse gas emissions
GHG	Greenhouse gas emissions
IEA	International Energy Agency
IOC	International oil company
JOA	Joint operating agreement
JV	Joint ventures
LNG	Liquified natural gas
LPG	Liquified petroleum gas
mbd	Million barrels per day
MBTU	Million British thermal units
Mmbtu	Million metric British thermal units
MSCF	thousand standard cubic feet
NAFPP	National Accelerated Food Production Programme
NAG	Non-associated gas
NASPA / NASPA-CCN	National Adaptation Strategy and Plan of Action on Climate Change for Nigeria
NEITI	Nigerian Extractive Industry Transparency Initiative
NERC	Nigerian Electricity Regulatory Commission
NGL	Natural gas liquids
NIMET	Nigerian Meteorological Agency
NIPCO	Nigerian Independent Petroleum Company
NLNG	Nigeria Liquefied Natural Gas
NOC	National Oil company
PEF	Petroleum Equalisation Fund
PIB	Petroleum Industry Bill
PMS	Petroleum motor spirit (fuel)
PPMC	Pipelines and Product Marketing Company
PPPRA	Petroleum Product Pricing Regulatory Authority
PPTA	Petroleum Profit Tax Act
PSC	Production Sharing Contract
PSF	Petroleum Support Fund
R/P	Reserves-to-production ratio
RE	Renewable energy
RMFAC	Revenue Mobilisation & Fiscal Allocation Commission
RPR	Reserves-to-production ratio
TAM	Turn-Around Maintenance

acknowledgements

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When we brought together the small but formidable group of Nigerian and international authors (they are introduced at the end of each chapter) for a first meeting during the Durban COP in November 2011, we took a whole day and half a night out of Hans Verolme's negotiation calendar to discuss, *Where next, Nigeria, Where*? The journey from then until the publication of this initial edition of Green Deal Nigeria was exciting and we want to thank the authors for so much enthusiasm and skill. Special thanks also to Sebastian Duwe who made his expert counsel available to the group whenever possible.

We exposed our ideas to an Advisory Panel and a Peer Review, and want to thank the following people for their critical and constructive feedback:

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We stole more than one night's sleep from Hans Verolme's life, so we need not only to thank him, but also the people around him, especially his son Fransis who had to make do without papa in difficult circumstances.

Christine K
Director, Heinrich Böll Stiftung Nigeria

preface

This study on the potential for a greener Nigeria is being launched as the country prepares its contribution to the Rio+20 summit in Brazil. When the world gathers in Rio to discuss how our one planet can provide a decent living for all people, a majority of Nigerians will be struggling to feed themselves for the day. Nigeria is a country of tremendous riches held by the very few in the midst of grinding mass poverty. But it is also a country where a growing middle class is waiting to join the world's consumers. The thought that buying microwave ovens, flying airplanes and riding one's own car cast a shadow of greenhouse gas emissions onto the lives of others might not even have occurred to many of them. Nigerians are desperate for progress and development, and rightfully so.

At the beginning of 2012, the Occupy Nigeria movement turned a strike against fuel price hikes into a general declaration of distrust against a ruling elite that is feeding on the spoils of one of the world's largest oil industries with little transparency or distribution of wealth. There was no green dimension to the Occupy debate and people were not concerned about CO2 emissions from fuel use. They rather worried about the rising cost of living as a result of the removal of the fuel subsidy.

There is, however, an urgent need to broaden the debate on Nigeria's development including corruption and bring practical sustainability issues into the deliberations. Nigerians need jobs – shouldn't these be green jobs? Nigeria needs energy – shouldn't this be as much renewable energy as possible? Nigeria needs agriculture – shouldn't this be an agriculture that will keep people on their lands and retain soil fertility for many decades?

This report is meant to contribute to a continuous debate within Nigeria and beyond. It is meant to inspire the Nigerian delegation to the Rio+20 summit and those who want to check what Nigeria does differently when the summit is over. This report is for government officials, bloggers, market women, farmers, experts and interested youth, for entrepreneurs and bankers. Because some of these people do not come to the usual workshops, this report will be translated into multi-media presentations with which activists will travel up and down the country. From the latter half of 2012 they will enter into discussions with and draw ideas and inspiration from those who matter most: the people of Nigeria.

For the above reasons, the report you hold has no final edition. It will be updated as long as its ideas continue to be debated. All in the hope that the debate will spur further ideas, a focus on green, socially-inclusive development and most of all inspire concrete action (see *Green Deal Nigeria* on www.ng.boell.org).

The Heinrich Böll Foundation Nigeria Office is one of 28 international offices of the foundation, which is headquartered in Berlin, Germany. The foundation is associated with the German Green Party, but is a legally autonomous and intellectually open political foundation.

Christine K
Director hbs Nigeria Office
Abuja, May 2012

Introduction

"It always seems impossible until it is done."
Nelson Mandela

by Hans JH Verolme

a brief history of the green economy

The world today faces multiple crises: a finance crisis, a climate crisis, a resources crisis, and as a result a social crisis. This is, however, in many ways a crisis foretold.

That there are natural limits to economic development was first recognized by the global policy community when in 1972 the Club of Rome published its "Limits to Growth" manifesto. It was intensely debated by governments in Stockholm at what was the first UN conference on environment and development. The potent images of recurrent famine in Africa, including Biafra, defined the views of this generation of policy makers and the debate had an unfortunate Malthusian flavor. Doomsayers claimed resource shortages would lead to conflict and it was implied that the development aspirations of the world's poor were to blame. The focus of debate was the environmental costs of increasing population in the global South.

Twenty years later, the landmark Brundtland report "Our Common Future" tried to overcome the limitations of that debate by introducing the concept of 'sustainable development' defined as "... development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Brundtland put environmental, social and economic development on the same plane. But following on the heels of the collapse of the USSR, the authors avoided a fundamental critique of free trade and market economy. Instead, the authors argued for the need for equity in development and strong global governance. In doing so, they laid the groundwork for many multilateral environmental treaties, including the Convention on Biological Diversity and the Framework Convention on Climate Change. The Brundtland report did not, however, foreshadow the coming wave of globalization and the economic and geo-political rise of Asia.

Today, as we prepare for the 20th anniversary of the 1992 Earth Summit in Rio de Janeiro, a new approach to overcoming the ever deepening ecological and ongoing development crisis has been put forward. UNEP defines this so called "green economy" as one that results in *improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. A* green economy is low carbon, resource efficient and socially inclusive including by creating new jobs. Three economic sectors are key to this effort: agriculture, energy and infrastructure. Most economists agree that over the past decade we have seen a misallocation of financial and human capital and an ongoing depletion of natural wealth. Their inside-the-box prescriptions to cure our ailing planet range from 'market incentives' to 'removal of perverse subsidies' to 'green investment'; what is lacking is a social and normative framework. When one reads the policy prescriptions for Rio+20 everything goes, a grab bag of ideas, old policies, some regulation, good governance, promises... but there is surprisingly little on values.

This international debate is pertinent to realizing the vision Nigeria holds of raising its people out of poverty and joining the ranks of the G20 by the year 2020. This report posits that Nigeria needs a vision for 2020 that goes well beyond growing the economy, a Green Deal that unites and inspires its people. It describes the current state of the nation in realistic terms and makes where possible concrete recommendations to

overcome existing challenges. The international debate is relevant to this Nigerian search for “the good life”.

Since 1972, the world has changed almost beyond recognition. Compared to 20 years ago, we are on the whole richer, but the gap between rich and poor has widened. Today there is a new scramble for Africa underway as part of the global scramble for resources: land, food, biomass, minerals, energy, water... Today, there is wealth everywhere, also in Nigeria but that wealth is not without social consequence. As wealth in the face of abject poverty can be offensive.

a critique of sustainable development and green economy

While by 1990 most people were ready to accept the fact that resource depletion, inefficiency and pollution can result from market failures, what can be done to correct them was less clear. At the root of the problem lie traditional measures of wealth and economic progress such as the Gross Domestic Product and the systems of National Accounts. In the 1980s economists like Herman Daly and Roefie Hueting showed how traditional GDP measurements 'rewarded' the destruction and waste of resources as both the creation of pollution and the clean up of it were considered 'productive' economic activity. The national accounts also did not show the value and depletion of natural capital and the goods and services society, often the poorest people, derive from them. Based on this flawed analysis, decision makers often made poor policy choices. Daly and Hueting successfully argued for a green(er) GDP, setting in motion a process of greening national accounts that continues to this day. An alternative to this difficult and fundamental overhaul of GDP and national accounts systems has been the development of indicators, like the Human Development Index by UNDP.

Building on this early work, by the late 1990s the importance of protecting and investing in social and natural capital received broad recognition. Economists argued that without recognizing the value of this 'capital' and with weak or perverse long-term regulatory signals the very basis of our economies would be undermined. While investing in natural capital is much needed, by opening up to the vagaries of the market the scarce capital held in trust by communities, one risks a further enclosure of the commons, like communal lands and water resources. These commons are essential to the survival of the poor and their privatization can only marginalize them further. There is a risk of misappropriating from the poor and communities 'their' natural capital. At the same time, there are examples where private ownership, in particular securing land tenure, has protected smallholders and the environment from misappropriation by elites. From an ethical point of view, one has to accept that nature cannot simply be defined as ecosystems’ goods and services, to be traded and sold to the highest bidder. What is the value of a blue butterfly in the early morning light, pollinating a crop? The debate over the consequences of putting a price on pollution, carbon, biodiversity, and forests really continues.

Since 2008, people around the world have become more skeptical of markets. If the free-markets and growth paradigm got the world into so much trouble, why would market instruments for natural goods and services not bring more problems? Policy makers try to make sense of the collapse of markets, including the one for carbon. The current crisis has seen a privatization of public goods and a socialization of private costs. Governments have had to bail out banks and other businesses deemed critical to national economies. The people are having to endure the consequences in the form of austerity measures, job losses, and budget cuts and fail to see why. The lack of trust in government and business runs deep. As inequality grows, after a period of social and economic convergence, the voice of the 99%, sounds everywhere: the Arab Spring, the Occupy movement, even in Nigeria. But being cognisant of market intransparency and poor governance, one can still see the importance of markets. Nobody is arguing for a (return to) a managed economy with targets imposed from above. The fear of a benign eco-dictatorship that manages growth in a planned

economy has been expressed including by people with direct personal experience of the communist system that collapsed in the early 1990s. Some even argue humans are hard-wired to aspire "growth." But the crisis cannot be ignored any longer. Regulatory capture by vested interest of government and corruption is a serious problem and needs to be addressed.

Is the green economy concept fiddling around the margins or real change? Clearly a transformation is not about investing 2% into green initiatives as proposed by UNEP but rather about reshaping the entire economy by steering 100% of investment onto a different pathway. This is where the Rio+20 preparations fall short. Furthermore, while there are rare examples of so called win-win-win opportunities, the experience is that real economic change can hurt. Whether it is the abolition of fossil fuel subsidies or prioritizing spending for renewable energy over other projects, vested interests are affected. As a general rule, if it doesn't hurt it's not a transformation. This is where the importance of social transition measures must be emphasized. The politics will simply not support some necessary measures if those impacted by the policy change are seen to be disproportionally disadvantaged and do not have the means to support themselves in the transition. The much talked about low-carbon economy can only be achieved through a just transition. The labor movement has an important role to play here.

a new growth debate

In the meantime old debates on growth have taken on new forms. Some pray that innovation will save their economies; in Germany innovation is faith. Others believe efficiency is the way to go. But they ignore the fact that efficiency gains often get absorbed by higher consumption (something called the rebound effect). In the West, forty years after "Limits to Growth" in recognition of the finite nature of our planet and from a position of some wealth, intellectuals study policies for de-growth or, to be more precise, steering growth into certain green sectors while shrink other, brown, sectors. In Asia a debate has been unleashed about the need to constrain consumption.

Furthermore, following the 2008/9 finance debacle and the bail-outs the question of the balance between government and the private sector is being debated again. The importance of good corporate governance was emphasized. The short-term profit focus (often measured in days, weeks or months) is widely viewed as problematic. What can we learn from, for example, community micro-banking here? Though after 30 years of "less government," deregulation, globalization and "free trade" the pendulum might swing back, there already is a strong push to return to business-as-usual.

Let's look at the basics. Nothing grows forever, so why would real-world economies? We have shown that GDP is a convenient but not an adequate measure of well-being as it fails to assess social exclusion, pollution and waste of resources. A false dilemma is being presented that says: despite the flawed nature of the GDP measure, a lack of growth results in a downward spiral towards poverty. But how to deal with the fact that unbridled growth results in a downward spiral towards depleted resources and social strife? What to do with greed – how many planets would we need? It is time for all to look at our own aspirations. What is a reasonable standard of living?

Clearly it is time for a more inclusive and inspiring vision. With this report we hope to support you in actively debating this vision. Nigerians' aspiration for the good life is central to that. In debating this vision recognizes the people lacked trust in government. People first see then they believe, hence the vision presented here is as concrete as was possible. Government needs to go beyond talking, government is a major investor and can steer procurement, set standards, lead by example.

In our view, business-as-usual is not an option, a Green Deal Nigeria is not a luxury but rather a necessity! Those who benefit from the current system might say let's look at the problem in 10 years when Nigeria is richer, but will it be? The aspiration of the government to lift Nigeria up economically and be a member of the G20 in 2020 might be ambitious, but will be unmanageable without a transformation of social and environmental problems in 2020. Finally, it is clear values matter, so what are Nigeria's values?

Let's talk about the good life!

Hans Verolme, lead author, has 20 years of global experience in the field of international environment and development. He has extensive experience navigating climate change politics, having worked as senior adviser to the British Embassy in Washington, DC, and as US and global director at WWF. He has thorough knowledge and extensive experience of development challenges and green economy. A Dutch national currently based in Berlin, he has lived and worked across the globe including in India, Kenya and the USA. A geographer by training, Mr Verolme has advised the British and Netherlands government, as well as the World Bank and many non-governmental organisations. In 2008, he created an international network of senior international climate change policy experts that collaborate on challenging strategic projects. From 2004 to 2008, Mr. Verolme acted as US and Global Director of WWF's Climate Change and Energy Programme. Prior to joining WWF, he served for over four years as the Senior Energy and Environment Advisor to the British Ambassador in Washington, DC, where he worked to communicate the UK approach to climate change to the US policy-making community. Prior to that, Hans directed the Biodiversity Action Network engaging in international negotiations on forests and biodiversity. He currently serves on the Board of the US Climate Action Network and is a standing member of CAN International's Political Coordination Group. Mr Verolme is a regular visitor to Nigeria, where he has trained negotiators for international climate negotiations and has engaged various audiences and authors during the preparations of this study.

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The Transformation from Fossil Fuel to Green Energy

Sustainable management of natural resources and the need for revenue transparency, subsidy reform and full deregulation

by *Ms. Lois Laraba Machunga and Miss Zumunta Machunga-Disu*

Imagine… a clear evening sky over Nigeria, with no heat or smoke pollution in the air. No candles where people gather to talk about the day's events, but street lamps and 24-hour refrigeration. Plug-and-play electricity throughout Nigeria, not from generators nor wood burning but from gas powered stations in the Niger Delta and the rest of Nigeria from Hydro and all, backed by other small scale renewable energy-Wind, Solar, Biomass generators, Cookstove…… Niger Delta communities and mining communities receiving a share of royalties as part of appropriation (other than through huge administrations such as NDDC). International oil companies cleaning up old spills. Youth unemployment down to 10 per cent, with many thousands working on the production of compressed natural gas and renewable technologies (RT).

Imagine… government publishing monthly figures of how much energy was used and from what sources and how much excess such as crude oil, natural gas and electricity was produced and sold, and no government official is involved in trading the commodities. Government regulating a commercial petroleum sector without fixing prices. Gas and renewable energy at par-competitive prices with oil in Nigeria's GDP as oil reserves are expected to expire about fourty-six years but have provided for intergenerational equity on use of resources! The Ministry of Environment certifying each petroleum exploration company, petrochemical and power plants for environment –carbon reduction compliance. Federal Inland Revenue Services staff well trained and rigorously applying a simplified petroleum tax regime, civil society monitoring monthly published figures of oil companies' tax payments.

introduction

The focus of this chapter is crude oil and natural gas and its importance for the green deal Nigeria. The Nigerian economy and the oil and gas sector are in a dialectic state. Nigeria holds large reserves of a depleting resource that will expire or substantially decline in the next 15-20 years for oil and some 70 years for gas. Energy supply from fossil fuels results in climate change, which needs to be urgently addressed through adaptation and mitigating strategies. These strategies will be aligned with the transition to a green economy. There is a need for a paradigm shift, diversifying the economic base towards sustainable renewable sources. A green economy is our overarching goal with improved human well-being and social equity, reducing environmental risks and ecological scarcities.

This chapter elucidates the historical poor management of Nigeria's fossil resources and documents the lost opportunities arising from wastage, loss of oil and gas revenues, poor governance structures, poor

conservation planning, damage caused by oil spills, gas flaring, and the weak linkages between the upstream and downstream sectors of petroleum.

The above-mentioned transformation can be achieved, first, using Nigeria's flared gas and tying the phase-out of fossil fuel to the reserves-to-production (R/P) ratio, i.e. to the depletion of crude oil reserves. Nigeria is currently at a "peak oil" state, even though gas and tar sands reserves are substantial. Impinging on this is the need for more domestic energy supply due to a fast growing population expected to rise from currently 160 million to an estimated 250 million people by 2025. It is recommended that Nigeria, in the short term, needs to capture and utilise the gas being flared, which will save people's lives and some of the remaining forest, and finance the transition to a green economy[1].

Whilst management problems and structural misalignment exist in the energy sector these are being variously addressed by the government. An example is the recent removal of the oil product subsidy on the 1st of January 2012 and the subsequent part reduction of the level of subsidy on petroleum motor spirit (PMS) putting the price from N 65/liter (about US$ 0.40) to N 97/liter (about US$0.60). Another example is the investigation by the National Assembly into corruption in the fuel subsidy system, the report of which was published in May 2012. The ongoing review of the extractive industry and institutional and fiscal reforms being considered under a revised Petroleum Industry Bill (PIB) and various committees are commendable. It is important to link relevant restructuring efforts to long-lasting economic opportunities for a wider group of Nigerians.

This chapter charts a 'petroleum exit strategy' for Nigeria by proposing structural changes in the oil sector to reduce corruption, spread the oil wealth more evenly among Nigerian citizens and make resources available to kick start a more sustainable, greener energy economy. Concrete alternatives to oil are discussed in the chapters on Clean Energy and Agriculture.

background

According to the 2011 report by the International Energy Agency (IEA), Nigeria has proven reserves of 37 billion barrels of crude oil and 187 trillion cubic feet (TCF) of gas. In addition, Nigeria has large deposits of bitumen (tar sands): at 42 billion barrels this outdoes existing reserves of petroleum. There are a further nearly 600 billion tons of proven low sulfur coal reserves. The ownership and control of all mineral rights in Nigeria is vested in the state. The state reserves the right to participate in any licensed block and to determine the type of contractual arrangements to or between members of allotted blocks. Based on the geology of the country, seven basins are identified. The Niger Delta has seen the most aggressive exploration and production, with the first oil being taken in 1958 and activities said to be reaching maturity. The deep water blocks still hold some additional reserve prospects.

"If Petroleum in Nigeria dries up that will make Nigerians sits up, it will make us to diversify to other things that will help in us in the economy of this country."

ABC1, 20 – 25, Male, Enugu[2]

[1] Picture: tar sands in Ondo State, by Victor Okhai

[2] *2020 - Young Nigeria's Perceptions*, research commissioned by hbs, May 2012

It is noted that hydrocarbon is a depleting resource. The reserves-to-production ratio based on some published data indicates about 45.6 years for crude oil proven reserves. With respects to natural gas, the R/P ratio is 236 years, based on proven reserves report of 2008 (175 TCF). However, from a technical stand point, only an average of 30-40% of these reserves are recoverable under current technology, depending on natural characteristics of the crude, reservoir conditions & other factors, giving an effective R/P of approximately 15 years for crude oil and about 74 years for natural gas, respectively.

Globally, Nigeria is the 3rd largest exporter of crude oil, though it ranks number 20 in production. There is an over-reliance on the export of crude oil and natural gas for immediate revenue to serve the country's annual budget needs over and above domestic consumption needs and supply of adequate energy for economic development. Out of an annual average of 2.2 million barrels per day (mbd), over 80% is exported.

Nigeria is also the ninth largest gas producer in the world and a major potential gas supplier, but similar to crude oil the major portion of gas produced is currently for export – to LNG (liquefied natural gas), NGL (natural gas liquids) and gas supply projects in West African countries. The proven gas reserves, consisting of about 50% associated gas (which occurs during oil drilling) and 50% non-associated gas (NAG). Currently, about one third of gross natural gas produced along with crude oil barrels is vented in the air and not harnessed for electricity production or and other uses. With 536 billion cubic feet (bcf) of natural gas flared in 2010 alone, Nigeria is the world's second largest venter after Russia. The associated gas accounted for a serious loss of income. According to the NNPC, gas flaring costs Nigeria US$2.5 billion per year in lost revenue, not to mention the local environmental and climate change consequences.

Only about 12% of the gas produced is re-injected into the wells, mainly for reservoir enhancement. The reasons for sustained gas flaring are discussed below in this chapter. None of the export gas plants provide for the transfer of the wet gas for liquified petroleum gas (LPG) production for the Nigerian market. Only recently efforts are being made and some marginal quantities are now being supplied into Nigerian markets. LPG is still largely imported and the price has been deregulated as far back as the year 2007. The government of Nigeria has been working to end natural gas flaring for several years but the deadline to implement the policies and fine oil companies has repeatedly been postponed with the most recent deadline being December 2012, which appears unlikely to be met. In 2009, the Nigerian government developed a Gas Master Plan that promotes new gas-fired power plants to help reduce gas flaring and to provide the much-needed electricity generation; however, progress is still limited.

Petroleum provides annual revenue of an average US$ 60 to US$ 70 billion depending on market oil price and accounts for over 90 per cent of the nation's total export earnings. In the year 2010, the net export revenue (nominal) earned by Nigeria was US$ 65 billion, according to OPEC. Crude exports accounted for 72 percent of current account receipts in 2010.

Unfortunately, crude oil and gas make only a small contribution to GDP, despite generating the majority of export earnings, as it is a highly technology and capital intensive industry that employs few people. The materials and equipment used in exploration and production are not produced in-country. There is minimal domestic manufacturing input to the oil sector, especially in oil product refining. Local content makes up about 5% in goods and services, though the Local Content Regulator claims higher rates. According to the

Central Bank of Nigeria (CBN), the oil sector had negative growth in the period between 2005 and 2007.

This minimal sector GDP growth has been largely fuelled by the increase in global market prices which started around the year 2000 due the quantum growth of other economies, mainly China and India. China has become very active in Africa, seeking access to natural resources essential to its rapid growth. In contrast, Nigeria is endowed with all kinds of natural resources but is unable to translate it into secondary and tertiary production for domestic growth.

harmonising energy legislation

The Petroleum Industry Bill 2009/2010 has been touted as the panacea for the unwieldy sector, but the PIB is currently undergoing another review and is yet to be passed into law. It attempts to revise "the legal, fiscal and regulatory framework - the institutions and authorities for the Nigerian petroleum industry, and to establish guidelines for the operation of the upstream, midstream and downstream sectors." The passage of the bill has been primarily delayed by conflicting interests, mainly on:

- the fiscal re-distribution of the economic rent, with oil companies opposing an increase in taxes and government perceiving the need to increase taxes to reflect changes of environment in a high oil price regime;
- increasing the community share of income by setting aside an additional 10% of profit revenue for oil communities. This, in addition to the existing 13% Derivation as per the Nigerian constitution and 3% of the oil budget which fund the Niger Delta Development Commission (NDDC);
- a struggle/expediency to retain some of the institutions, such as Petroleum Product Price Regulatory Authority (PPPRA) and the Petroleum Equalisation Fund (PEF), which in our view have no proper place in a deregulated market-driven downstream industry.

The PIB draft bill has several weaknesses and may not in the end adequately address the grim situation in the industry. The PIB that deals with the devolution of powers (institutions) of the Petroleum Minister is embedded amendments to the Petroleum Profit Tax Act (PPTA) of 1958. It is our opinion that the PPTA should be amended apart from the duties of the Minister which are under the Petroleum Act, 1969, as its 'gross summary' in the PIB even threatens the administrative details of tax management.

In Nigeria, hitherto it has sadly become common practice for taxation rules to be written by the operators of the petroleum industry by themselves for themselves! This is one of the reasons for the years of abuse and the non-transparent revenue management in this sector. The Nigerian Extractive Industry Transparency Initiative (NEITI) has already challenged the government not to pass the PIB in its current form as it is a "give-away" and will reduce revenue by millions of dollars.

the government as "investor" or "regulator"

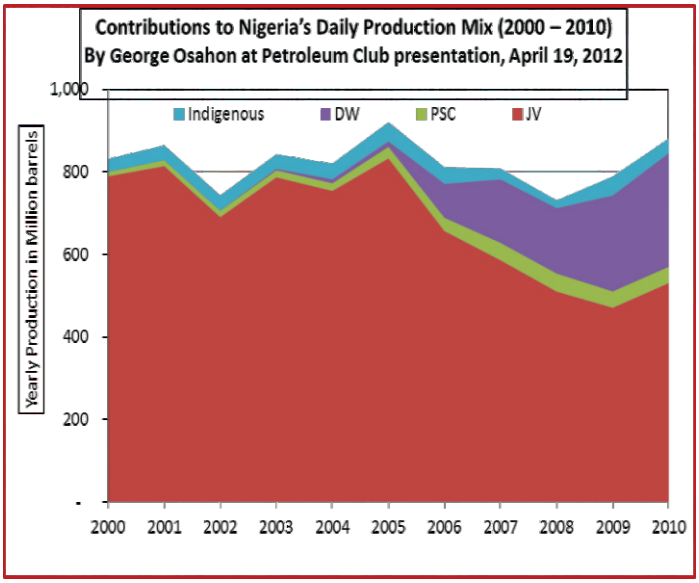
It is the role of government to regulate and create a suitable investment climate in the petroleum sector. At the moment, the government acts both as regulator and investor, in that it makes cash calls to fund upstream sector joint ventures (JV) and provides the budget to the NNPC for capital investments and major operating expenses ("priority projects"). This has fostered inefficiency, corruption and mismanagement of financial resources, as a true cash flow of the NNPC and JV upstream cannot be segregated in normal economic practice.

An investor cannot regulate itself! This has given rise to a complex situation, with a negative outlook:

- The government is unable to supervise and audit the petroleum sector effectively;
- Poor quality financial policy systems are used in the sector;
- A system of paying the majority of cash calls in US dollars which further violates the national accounting policy (a practice started in about 1985 by a simple instruction by the Federal Ministry of Finance (FMF);
- Payment of contractors in foreign currency (a decision made in a simple letter issued by the Ministry of Petroleum in 1993), thus depleting national foreign reserves and creating a sub–currency market that adds pressure on the value of the Nigerian Naira.
- Low level of operatorship status by NNPC/government resulting in a lack of/weak control over management of natural resources, over Work Programme, Budgeting and Performance set by Joint Operating Agreements (JOA) and the Production Sharing Contract (PSC) management committee procedures. As a result, these programmes focus on the export of petroleum rather than serving domestic markets where adequate electricity production would have been a possibility;
- Political and partisan interests that dictate the selection and nomination of key management positions thus accelerating poor governance.

the role of government in upstream licensing & indigenous capacity development

It is safe to say that Nigeria's oil licenses (acreage blocks) are in foreign hands, as the production, operations and management of JV and PSC are held 100% by foreign interests, i.e. international oil companies (IOCs) who operate about 98% of total country assets of crude oil and natural gas as well as the outputs in crude oil and natural gas; with government functioning as a non-operator holding an aggregate of 57% joint venture participating interest share and an average of 20%-30% "profit oil" share in the PSCs. Local indigenous assets are extremely low, and even major portions, due to lack of access to finance are ceded to foreign technical partners, which reflects in less than 7% of the total national output per day. This is a far cry from what the oil sector could contribute to the domestic economy through indigenous players.



Furthermore, so far, even though Nigeria could be called a gas province more attention has been paid to oil production than to the production of natural gas.

"We cannot do without the Government because when there is no head there's no tail. Without the Government we can't exist, it's not realistic and possible."

C2DE, 20 – 25, Female, Lagos Semi Urban[3]

[3] *2020 - Young Nigeria's Perceptions*, research commissioned by hbs, May 2012

natural gas & unabated gas flaring

It is the law to stop gas flaring. The initial charge set in 1985 was two Nigerian kobo per thousand standard cubic feet (2k/MSCF), equivalent to US 4 cents/MSCF at a time when crude sold at US$ 20 – 28 per barrel. The penalty was increased, lastly in 1998 to N10/MSCF. But this needs to be viewed in the context of the low valuation of the Naira and the current oil price of US$ 110/barrel. Interestingly, the penalty is applicable to the operator even if the government has contributed cash calls to an operation and has thus indirectly contributed to the flaring.

The key issues with regards to the flaring of gas are:

- There is no policy in place that makes approval of the Field Development Plan (FDP) by the Department of Petroleum Resources (DPR) contingent on associated gas either going into a gas utilisation plant or be re-injected;
- There is a lack of domestic infrastructure to connect to users and no open access to pipelines for 3rd parties;
- The focus of producers/operators is on the export gas market;
- A lack of access by 3rd parties to large equity gas reserves that are held by the government and joint venture companies;
- Low domestic gas purchase prices and unpaid bills of gas already supplied;
- The low penalty for gas flaring (N10/MSCF or $0.064/MSCF).

Without proactive intervention, the IOCs will continue to sit on undeveloped gas assets that are not accessible to 3rd parties; they will flare gas at little cost and export the gas to distant markets at the detriment of domestic energy supply. This is aggravated by a domestic gas price structure that results in artificially low prices. The Gas Master Plan (GMP) was to address some of the problems, but it was based on the premise that 3rd parties can buy gas from upstream suppliers.

On 24 March 2011, President Goodluck Jonathan launched the Gas Revolution, intended to reposition Nigeria as a global industrial hub. The plan is to attract US$ 25 billion in investments and create 500,000 jobs through a public-private partnership. Investors from Saudi Arabia, India, Italy and the USA, as well as Nigeria, have signed on to the plan. The gas industrialisation agenda goes beyond current gas-to-power initiatives by establishing a central processing facility in Oviakwu, Rivers State, a mega petrochemical plant and two fertilizer plants in Lagos and Delta States. Taken together, the gas-to-power and industrial projects would support the elimination of gas flaring in Nigeria as the markets thus created would have the potential to use all currently flared gas.

gas pricing

The domestic pricing of gas leads oil producers to devise projects for export. Citizens are held hostage without electricity as no investor can make a reasonable return on investment. This is despite the introduction of several fiscal incentives. The domestic gas price is extremely low by international standards, inappropriate if any reasonable return on investment is to be attained. Prices to the electricity sector are US$ 30 cents/MBTU (compared to US$ 7/MBTU in the USA). The PHCN currently pays US$ 0.12/mmbtu, which equals about US$ 0.70/boe (2% of the current oil price or US$ 30/bbl), while the Nigeria Liquefied Natural Gas (NLNG) pays US$ 0.5/mmbtu, which equals about US$ 3.00/boe (10% of the current oil price).

A sector based pricing framework was developed in 2009 to encourage domestic gas projects, especially for the electricity sector. Unfortunately, no gas seems to be available as most is committed to export. In the meantime, the IOCs will not permit 3rd parties access to gas resources and this may hamper the Gas Revolution agenda. The low domestic gas prices make a case for 'buy cheap and sell high'!

The lack of gas availability to domestic power is a serious problem. Media reports from 3 January 2012 quote Minister of Power, Prof. Barth Nnaji, saying that the nation was currently generating 4,300MW of electricity although it had the capacity to produce 5,100MW.

the downstream sector - oil products, the need for deregulation and subsidy reform

The so called downstream sector processes crude oil and natural gas. It produces oil, petro-chemical products and chemicals, as well as gas products like methane for electricity production, NGL and LPG plants.

oil products downstream deregulation and subsidy removal

The much debated decision to fully remove the consumer subsidy at the beginning of 2012 initially saw the price of petrol rise from N 65 (US$ 0.42/liter) to N 141 (US$ 0.90/liter). Under pressure from a sustained strike led by labour unions, the price was adjusted downwards to N 97/liter (US$ 0.62/liter) on January 17, 2012. The intent of the subsidy removal was to create a petrol market which would make fuel available without the current large-scale corruption (as described in the National Assembly's investigation report of May 2012) and where prices would eventually regulate themselves. The social toll of a 'landing price' of about N 140 per liter seemed to have been acceptable to the executive, but it was not acceptable to millions of people who saw their monthly income swallowed up by the increased cost of transport and food.

The government, according to the Federal Ministry of Finance, estimated that the cost of bridging the gap would in 2012 amount to N 1.2 trillion (US$ 8 billion). This would represent one third of the 2012 annual national budget provisions. However, the National Assembly probe, led by the chairman of the ad hoc committee on subsidy Farouk Lawal, revealed how Nigeria spent N 2.587 trillion in 2011 alone, instead of the budgeted N 240 billion! This revelation was still being critically examined at the time of writing this report.

The Nigerian petrol price in 2011 of N 65 was the lowest in the West African sub-region. In Niger, for example, petrol costs US$ 1.20/liter. This has led to a significant illegal cross-border trade. Some comparative prices for petrol in 2008 are given in the table below. Smuggling will continue until there is a full deregulation and a better aligned, more transparent sub-regional market would emerge. The Nigerian media reported that the International Monetary Fund (IMF) was pushing various governments in the sub-region to remove fuel subsidies as these subsidies were not effective in aiding the poorest, but instead providing a source of corruption and smuggling. In 2011, the governments of Nigeria, Ghana, Guinea, Cameroon and Chad all moved to cut subsidies[4].

Comparative price (US$ per liter) of petrol - 2008

Chad	1.25
Cameroon	1.13
Niger	1.12
Benin	0.93
Nigeria	0.44
U.K.	1.76
USA	1.77

[4] Figures in table from Federal Ministry of Finance, OPEC

The key benefits of subsidy removal and further deregulation are:

- It encourages private investment in infrastructure like depots and refineries, thus improving supply.
- Ensuring adequate supply will cause marketers to compete on service to the customer and other value-added products.
- The increased competition among marketers will eventually result in lower prices to the customer.
- It ensures capital recovery by investors as it is petrol and kerosene that currently account for over 75% of the petroleum products market.
- It assures that government receives taxes and that investors make a reasonable profit.

Petrol makes up about 75% of the product mix with the balance being kerosene, Low Fuel Oil, diesel and LPG. The prices for these other products were already deregulated around 2007. The petrol subsidy is paid by the government to traders or to the NNPC and amounts to the difference between NNPC's ex-depot price or the Landing Cost of imported oil products under the Fixed Pricing Regime established by the Petroleum Products Pricing Regulatory Agency (PPPRA). The PPPRA is responsible for fixing prices based on a pricing template that uses import parity prices and adds mark ups for transportation, distribution, marketing and a guaranteed margin.

Since 2003, the NNPC pays international market prices for crude oil, but the income it gets from the domestic sale of crude oil is insufficient to meet the import cost. Hence, in 2005, the Revenue Mobilisation & Fiscal Allocation Commission (RMFAC) created a structured system aimed at increasing transparency. The Petroleum Support Fund (PSF) was created under the Federal Ministry of Finance (FMF) from which the differential is paid after information is gathered from the NNPC and PPPRA. This, however, has led to corruption. A government committee stated that in 2007 the Nigerian Custom Services showed about 700 cargoes docking at ports, yet the NNPC submitted 1,200 cargoes for subsidy payments. No punitive measures were taken.

the dialogue on subsidy removal

The subsidy removal in early 2012 resulted in a strike unprecedented in Nigeria's history, as it brought organized labour but also a large numbers of individual citizens to the streets who had effectively lost a large portion of their purchasing power due to the increased petrol price. Protesters rejected the idea of giving a sacrifice in order to reduce the large scale corruption in the subsidy system. If government wanted to right a wrong, they were asking, why should poor citizens suffer for it? Government's delay in paying civil servants their recently agreed minimum wage of N 18,000 (US$ 115) per month was another reason why Nigerians manifested their distrust of government.

On 20 December 2010, the government had presented the unions with a Subsidy Reinvestment and Empowerment Programme (SURE-P) consisting of projects that would benefit from the savings resulting from the removal of the fuel subsidy. Among projects cited were the construction or completion of eight major roads and two bridges, provision of healthcare to 3 million pregnant women, six railway projects, youth employment, mass transit, 19 irrigation projects and rural and urban water supply projects. The Presidency's presentation of the SURE-P appeared to restate the intentions and promises voiced by the Babangida, Abacha and Obasanjo administrations - promises that had not been kept.

the wider problems of fuel subsidies: policy choices and the need for deregulation

The problems facing the downstream segment of the oil and gas sector extend beyond the subsidy issue. They include:

i. **massive imports**
Over 90% of petrol is imported in order to meet domestic consumption needs in Nigeria. A full cost-benefit analysis of the fuel subsidy system would reveal costs beyond the annual US$ 8 billion in subsidy for imported products, as this only relates to primary costs.

ii. **low refining capacity**
Over the past two decades, local refineries have functioned at 30-40% of capacity or less.

iii. **poor maintenance culture**
The biannual mandatory Turn-Around Maintenance (TAM) schedules are not kept.

iv. **limited authority to incur expenditure**
The limited authority to incur expenditure by the NNPC does not permit quick or emergency responses to operational exigencies common in oil and gas plants. This contributes to frequent shut downs.

v. **long decision making process/turn around for completion of contracts**
It takes an average of 1-2 years, in some cases up to 5 years to put in place contracts for refinery maintenance!

vi. **substandard products**
Unlicensed processors of crude and traders participate in the market place. Media reports in 2010 stated that over 100 ad hoc refineries had been discovered and shut down in the Niger Delta region alone. Sub-standard products still seem to enter the market.

vii. **cost structure of the import logistic chain & unused tie-down capital**
Tight offloading capacity at the facilities of the Nigerian Independent Petroleum Company (NIPCO) and NNPC result in high demurrage: about N 113 billion (about US$ 900 million) in 2008 alone. Furthermore, the cost of capital tied down in unused refining capacity comes at a cost**.**

viii. **low margins for investors**
The revenue accruing to investors is low, except in those cases where the PPPRA pricing template has been fraudulently abused. This is due to the large differential between the regulated domestic price and the international market price. It is further exacerbated by high infrastructure costs for distribution. As a result the government collects little or no taxes. One example is NNPC's subsidiary PPMC (Pipelines and Product Marketing Company), which has been reporting losses over the last decade.

ix. **over-pricing**
It is alleged that in some cases sellers pay Rotterdam prices, but will charge Nigeria a higher price by discharging and reloading so as to obtain a new bill of lading and certificate of origin reflecting the price at the second port. Apparently, Cote d'Ivoire has been used as one port for this malpractice.

A 19% guaranteed margin, since the creation of the Petroleum Product Price Regulatory Authority (PPPRA) for importing traders, reflects an uncompetitive and inefficient downstream sector. Indeed

it represents another fixed price mechanism that bears no direct relationship to market forces and opportunities exist for cost reduction.

x. **inability to re-invest in and expand the downstream sector**
No additional refinery has been built since 1986.

xi. **mismanagement and corruption**
NNPC's 2005 report on *Crude Oil Allocation, Products Import and Export* discovered that N 17 billion in revenue was lost due to the decision to sell fuel oil to four companies at domestic prices. Several financial scandals involving the PPPRA and the Petroleum Equalisation Fund (PEF) continue to be reported.

xii. **creation of poor market structures**
A non-competitive market brings about monopolies or oligopolies. There are few dominant traders and there have been few new serious entrants into this market for 10 years, besides the proliferation of many brief-case entrepreneurs in the downstream.

xiii. **impact on other dependent economic sectors**
Transport, manufacturing, agriculture, even education have suffered the vagaries of limited availability of fuel.

xiv. **the disadvantage of fixed prices**
Fixing prices is a disincentive to private investment - both foreign and local, and an inhibitor to market entry.

xv. **the rising number of incidents**
According to NNPC, vandalism has increased from less than 1,000 incidents in 2003 to over 3,000 in 2006, though these numbers are contested by the communities. In many cases, the petrol is stolen and sold on the black market. It is hoped that greater policing, preventive surveillance, the amnesty and strengthened environmental policies will stem this tide in the Niger Delta.

subsidies in the upstream sector

funding gas development
In our view, as long as the major source of funding to the oil and gas sector is the Federal Government of Nigeria there will be limited gas development. A radical change in approach is needed, starting with the withdrawal of the government as an investor in the sector, and with the capitalisation of the National Oil Company (NOC) prior to open market capitalisation as proposed by the PIB.

the role of subsidies
Even without introducing taxes, subsidy and trade barrier removal at a sectoral level would improve efficiency and reduce environmental damage. In Nigeria, removal of the following subsidies needs to be evaluated:

- Gas flaring penalties and Field Development Procedures (FDP): The current regime of low flare penalties (N 10/MSCF) sustains gas flaring as it is cheaper to flare than to invest in gas utilisation. This negative situation is further aided by procedures of approval for Field Development Plans (FDP) by the Department of Petroleum Resources (DPR), which require oil companies to submit their gas

development programs only after the approval of the FDP. Furthermore, it is at the Minister of Petroleum's discretion to issue certificates to permit gas flaring. Stopping gas flaring would substantially reduce greenhouse gas emissions, increase investments and recover an estimated US$ 2.5 billion in gas revenues annually;

- Gas pricing: natural gas prices are set on a discretionary basis. This system is opaque and not tied to changing market environments. There is no structured clear basis for setting tariffs and wholesale prices. The PHCN, for example, pays very low prices for gas supplied to their thermal plants, which amounts to an estimated US$ 50 - 90 million annual subsidy. This is a disincentive to investment in gas gathering infrastructure;

- Non-payment of electricity bills by public sector institutions to PHCN and in turn PHCN debts to NNPC for supply of gas amount to millions of Naira in indebtedness;

- Fiscal structure: Nigeria has built-in subsidies in the natural gas supply pricing structure and its downstream gas utilisation tax policies. These subsidies extend, for those who have upstream operations, so far that they can charge all gas development cost to the oil revenues, which effectively reduces the Petroleum Profit Taxes payable to the government. Thus, the government is actually paying for gas projects through this 'tax shadow system'.

- The Petroleum Profit Taxes do not reflect the recent crude price increases in the market;

- The removal of the oil products subsidies, in particular for petrol and kerosene, would reduce corruption and bring about re-alignment of market forces that will encourage competition and investment in the sector and reduce the government deficit.

alleviating the impact of subsidy removal while sustaining the pricing of oil products

Government and civil society must unite in managing the fuel subsidy removal. The government must recognise the impact on the depreciated value of the Naira vis-à-vis the price of oil. Prior to 1986 the exchange rate was stable. The failed Structural Adjustment Programme, exacerbated by the recent economic and financial crisis, has brought the Naira to its knees; depreciating to about N156 to the US dollar or over N160/US$ on the parallel market. The high real price of petrol against the domestic peg at N 65/liter added weight to calls for a correction. *A transparent index pricing mechanism should be used to avoid constant wrangling over the pricing of oil products.* Furthermore, pressure on the Naira can be reduced by cutting wasteful government expenditure at the federal, state and local level.

To remedy this situation, a comprehensive package of actions should be implemented with milestones for the short, medium, and long term.

tackling & punishing corruption

The government needs to rebuild confidence among citizens by consistently tackling corruption. This drive will strengthen its credibility and thus support the drive to remove subsidies and further deregulation, this time with the well-being of citizens at its center.

- **liberalizing import and trade of petroleum products**
  The oligopoly of the "specially selected traders" needs to be broken-up, with a strengthening of oversight by the DPR, the Ministry of Environment and the testing agencies employed for certification of

specifications/quality standards.

- **ease of market entry for new investors**
  Prior to the enactment of a revised Petroleum Industry Bill (PIB), an open-access policy and ownership-sharing of refineries, depots, pipelines, jetties can be implemented.

- **expand and support public transport systems**
  Significantly expand public transport systems across all states. The federal government can set up an incentive system to support states and local governments to comply.

- **establish fuel dumps for public transport**
  In some countries public transport companies are served by special fuel dumps, which in Nigeria could be supplied on a priority basis with compressed natural gas (CNG) for city transport. Whether biofuels provide a sustainable alternative to petrol needs to be assessed carefully against the need for increased food production on a limited amount of available land.

provide macro-economic & fiscal stability through a price index system
Interest and foreign currency exchange rates significantly impact on the petroleum pricing regime. There is a need for an indexing system that links the domestic price of petroleum, utilities services and salaries. This system can serve to remove market distortions.

- **restructuring the downstream sector**
  The PPPRA and PEF are rooted in the subsidy regime and exist because of the politically stated aim of uniform petrol prices across the country. Unfortunately, the Petroleum Industry Bill (PIB) as proposed in 2009 entrenches the current regime. A deregulated downstream sector would allow market forces to establish the distribution cost across the country, similar to consumables like *gari*, tomatoes and yam which do not have uniform prices in every region. As a result, PPPRA price controls would be redundant, as competition will reduce the currently wide margins and fixed prices. In line with international best practice, the recently established Commodity Price Control Board and a Federal Energy Commission (which we are recommending in this report to be established, see below) can oversee this change. Otherwise the current practice of a manipulated pricing template will be sustained.

- **restructure the NNPC trading function**
  A commercial NNPC should have a full-fledged trading operation similar to Kuwait, Petrobras and Statoil, that can participate directly in the market place. Currently, NNPC only has a limited global trading operation through Nigermed, Napoil and Hyson, relying on brokers to handle their crude oil trade and appointed third parties to import products.

- **capitalise (or privatise) NNPC**
  In the context of the proposed reform package, NNPC or the new National Oil Company (NOC) proposed in the PIB, urgently needs to be capitalised and given control of its downstream cash flow and capital investments. NNPC, operating at arm's length from government or as a privately-held company, should sell crude at market prices and should similarly sell downstream products at market prices. This has three benefits. Firstly, an instant price drop will occur, similar to what was seen when price controls of 'essential commodities' (sugar, milk and rice) were lifted in the 1990s. Secondly, a reduction in corruption as a result of the elimination of middlemen is anticipated. Thirdly, NNPC can finally focus on the business of refining since it can market what it produces, charge a market price, and import any differentia - all in competition with other importers and private refineries.

- **NNPC to reduce its credit grace period and demurrage**
  The NNPC should reduce the current 60 and 90 day credit grace periods for domestic traders and crude oil traders respectively. The long grace periods unduly benefit these traders.

- **eliminate term contracts for crude exports**
  The resources thus raised should be allocated on a priority basis for construction of domestic processing capacity. Less export of primary products (crude oil and natural gas) creates added value, employs greater numbers of people in petro-chemical manufacturing plants. Some past mistakes include the KRPC refinery in Kaduna, where no consideration was given to the cost of importing heavy crude, and the granting of 20 refinery licenses in 2000, without carrying out an analysis which crude streams and reserves could be dedicated to them[5].

In the long term, the following restructuring is needed to help Nigeria transition from a mono commodity economy to a sustainable growth economy:

- **invest in alternative energy**
  Encourage a diversification of energy sources to solar, wind, bio-fuels, as discussed elsewhere in this report.

- **create an integrated energy planning system for upstream and downstream sector**
  Without domestic research and development (R&D), studies and feasibility projects, Nigeria will lack the information necessary for effective resource deployment and utilisation.

- **establish at the Nigerian Stock Exchange a commodity market for crude and petroleum products and encourage the same in the Western Africa region**
  To promote market transparency, we recommend the government proceeds with the planned launch of a commodity exchange in Abuja. Similarly, we see merit in the creation of such an exchange for ECOWAS.

- **create a strong statistical data & reporting basis for the entire sector**
  A good example of such an organisation is the US Energy Information Administration (EIA). A Nigerian version of this kind of organisation can align current information and projections and will require access to information on all activities of the industry.

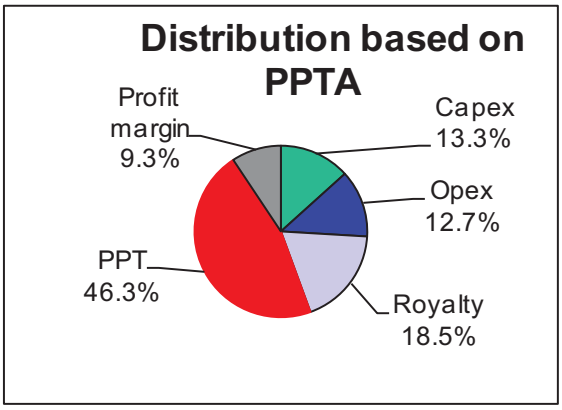
- **full deregulation of the downstream sector**
  The government should end its role as an investor in the downstream sector and limit its role to that of regulator. A first step would be the strengthening of oversight and regulatory bodies.

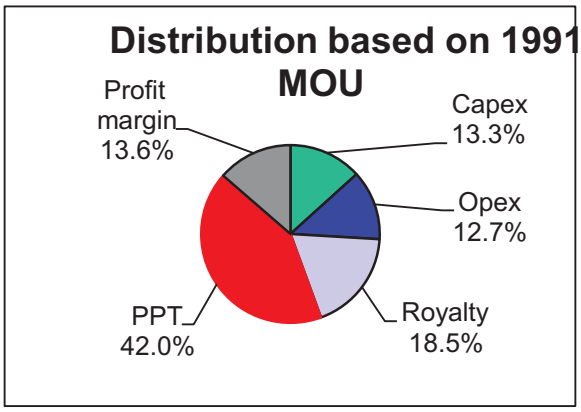
- **industrialisation and development of a petroleum-allied industry (backward integration)**
  Nigeria needs industrial capacity in allied industries such as construction, maintenance, transportation and marketing to support the oil and gas infrastructure. Developing this allied industry will create jobs and provide, for example, for a faster turn-around in maintenance.

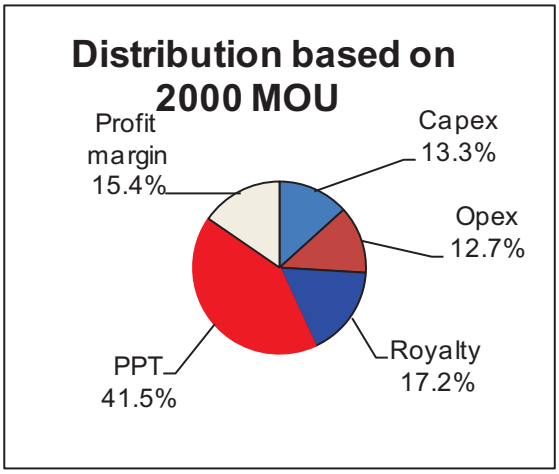
[5] The editor notes that a sustainability debate on the future of the chemical industry in Nigeria is necessary to align with global developments in a climate constrained world.

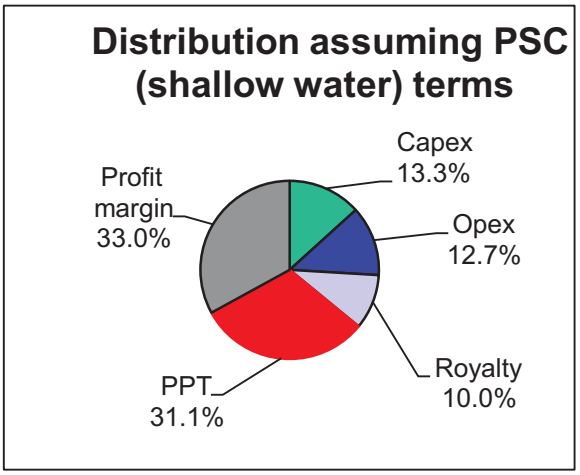
revenue management

Taxation of natural resource use should fairly and efficiently distribute resource rents to investors and government in a manner that does not discourage investment nor should it discourage investment in *other* sectors. In Nigeria, a highly differentiated structure of royalties, taxes and levies across the upstream and downstream sectors has resulted in a non-transparent revenue and accounting system that has led to large economic losses to Nigeria and large-scale corruption. It must be noted that legislative changes pending in the USA (Dodd-Frank) and Europe, resisted by the IOCs, could force all publicly-traded companies to provide transparent project-by-project accounts of payments to Nigerian partners. Though the nominal rate of the petroleum profit tax is 85%, the effective rate is dramatically lower. Prior to now, the Memorandum of Understanding, first signed in 1986 when prices ranged from US$ 10 - 20, allows many deductibles and higher margins. Special project terms for NGL and NLNG projects exist separately from other terms. The existence of Production Sharing Contracts and Joint Operating and Participating Interest Agreements for projects with direct government participation complicate the picture further, though the real life outcome is clear. While the industry complains about high taxes, the effective tax rate lies in the range of 40-70%, depending on a company's costs and the price of crude in the market place and unnecessary permissible deductions. This is very low by international standards, Saudi Arabia and Angola, for example, charge 90% or more. The resulting windfall profits carry high economic and political costs.









The transparency problems arise through the interplay of non-commercial structures, regulations that are obsolete or no longer reflect the changed environment, and a limited capacity of regulators. When

combined with the market power of the oil companies these fuel a culture of corruption and understated taxes to government.

Specifically, tax returns prepared by oil companies are blindly relied upon by the Federal Inland Revenue Service (FIRS). Its staff is poorly remunerated and lacks the know-how to assess technical cost or even track crude prices. One further source of corruption is the licensing process, which is easily manipulated, and a signature bonus payments system that lacks transparency. The lack of transparency and the evident corruption, coupled with the inability of the authorities to assess the correct tax has given rise to the creation of the Nigerian Extractive Industries Transparency Initiative (NEITI). The revenue management problems described are not unique to Nigeria. This led in the early 2000s to the launch of the international Extractive Industries Transparency Initiative (EITI). Nigeria subscribed to EITI principles and enacted it into law in 2007. NEITI has commissioned financial, physical and process audits for the period post-1999 - the first comprehensive audit since Nigeria struck oil in 1956. NEITI recently commissioned the audit of 2009-2010. Unfortunately, NEITI itself has only limited capacity and civil society and development agencies have stepped up to assist it. They view NEITI's work as a major component of the on-going anti-corruption drive.

Even today the most basic industry data lie hidden behind a fog. Firstly, there is no independent evaluation of the "proven reserves" and production. An independent reservoir management is non-existent, except as supplied by Operators (IOC or indigenous independent company). The 2004 discounting by Shell of its reserve portfolio following the setting of new compliance standards by SEC in the USA is exemplary. None of the relevant Nigerian agencies (DPR, NNPC, FIRS) was able to confirm or challenge the data. Secondly, daily crude oil and natural gas production data cannot be reconciled. There is no system that provides 'real-time' reporting from well-heads, which is internationally common practice. All attempts to install those systems, even after contracts were issued have been thwarted by operators and NNPC officials. As royalty payments are made on a gross production basis these are likely understated. Gross Production in the calculation of Petroleum Profit Tax (PPT) returns suffer from the same problem. NEITI has reported that crude production figures for 2006-2008 are still disputed between the Department of Petroleum Resources (DPR), companies including NNPC, and the international terminal operators. Add to this the alleged oil theft aka 'bunkering', which is assumed to be widespread and estimated at over 100,000 barrels per day, constituting about 5% of the country's production.

Removing the incentives for fraud begins with a simplified tax system, the revocation of MoUs with international oil companies and an urgent review of the PSC terms. The myriad of complicated formulas, multiple deductions and multiplicity of taxes for each investor confuses the administration of taxation. The *Oil & Gas Technical Background Paper* to this chapter provides further details of the problems and potential technical and legal solutions on the revenue management of the sector[6].

recommendations on revenue management

To reduce interference by oil companies, a protocol setting out how and when tax terms can be amended needs to be put in place. This might put an end to the practice of companies advancing tax policies behind closed doors or extracting changes to fiscal terms without due process. The tax proposals contained in the revised PIB should for the sake of audit continuity be transferred and adopted as amendments to the existing Petroleum Profit Tax Act. The National Assembly should rely more on independent technical and economic experts to pass the relevant laws. Removing the unwarranted deductions (estimated by the author to reduce revenue by 40%) can be accompanied by the introduction of a single tax rate for each sub-sector that will increase transparency.

In order to cut the umbilical cord of the government as investor and the NNPC as commercial entity, the

[6] Available at www.ng.boell.org

"cap of investor" needs to be removed. This will allow for a full assessment of the value of Nigeria's equity holdings through joint operating agreements and production sharing contract terms and in the NNPC.

Finally, capacity needs to be strengthened and remuneration increased in the tax office. Corrupt officials need to be punished.

environmental and social impacts

Oil exploration and production has a large environmental footprint and the suffering of the people of the Niger Delta is well documented. Exploration opens up remote pockets of rainforest and mangrove swamps. It is accompanied by seismic work injurious to people, water courses, and fauna and flora. Petroleum exploitation brings with it spills, well blow-outs, ballast discharges and the improper disposal of drilling mud. This has resulted in damage to marine wildlife, modification of the ecosystem through species elimination, delays in biota (fauna and flora) succession; a decrease in fishery resources, and the loss of the aesthetic values of beaches due to unsightly oil slicks. Indirectly and ultimately, the burning of oil as the prime fossil fuel contributes to dangerous climate change[7].

Development in the region has not been socially inclusive. The opening up of these remote locations brings with it human "invaders" that plunder resources, impact on the culture and moral ethos. This has led to socio-economic dislocation of Niger Delta people and has left many impoverished. Women have been particularly impacted. As they are the purveyors of water, fuel wood for food, health care, sanitation and child bearing, they are most affected by deforestation, oil spills, soil erosion and gas flares, and by the climate change impacts that cause flood, droughts and ecosystem degradation. Panos photographer George Osodi captures images of this "paradise lost" in his book, "*Delta Nigeria: The Rape of Paradise.*" The problem needs to be urgently addressed at multiple levels.

prevention of oil spills & an end to gas flaring

Oil spills and gas flares cause severe damage to land, creeks and communities. These are avoidable risks as they arise from poor operation practices, wanton vandalisation, or are policy-induced as in the case of gas flaring. According to some records, the problems reached a peak around 1999, resulting in over 100 shut-in of oil wells producing half a million bpd. Examples of major spills (that are by no means exhaustive of the spills that occur regularly along Nigeria's coast) include:

- Two consecutive spills in 2008, caused by faults in a pipeline, resulting in thousands of barrels of oil polluting the lands and creeks of Bodo and Ogoniland;
- In early 2012, Shell was forced to shut down its entire 200,000 bpd Bonga facility, about 120 km off the coast, after the biggest leak in Nigeria for more than 13 years. The oil washed ashore the densely populated region.

The 2011 UNEP report on the environmental damage in Ogoni land estimated the clean-up cost for this area of the Niger Delta to amount to US$ 1 billion.

[7] Picture: Oil spill, by Fidelis Mbah

introduce accountability for restoration, if necessary through the courts

Royal Dutch Shell Nigeria has been slammed with a lawsuit over the frequent oil spills and pervasive air pollution from its refining operations in Ogoniland. Amnesty International and the Centre for Environment, Human Rights and Development (CEHRD) said Shell must pay an initial sum of US$ 1 billion to begin the clean-up of oil spills it caused in the Niger Delta region. Similar legal cases filed in the Americas have been successful.

mitigate community unrest

Random barricades of oil company offices and drilling locations, as well as strikes by oil workers are common place. Due to repeated oil spills the hitherto cordial relationship between the oil company and the host community has given way to distrust and mutual suspicion. The blockades are not about compensation, but about the degradation of the environment**.**

contain the rising cost of militancy

In spite of millions of dollars in funding and a national consensus in support of the Indicative Niger Delta Management Plan (INDMP), the Delta lacks basic social and economic infrastructure – even small scale industries – and amenities like clean water, electricity, healthcare, schools and communication. Admittedly, this problem is not unique to the Niger Delta. A lack of socio-economic infrastructure is a problem across Nigeria's rural areas, which is largely due to their low political priority and the misuse of funds.

In the Delta, hostage taking of oil workers, especially expatriates to demand ransom, and piracy of boats, helicopters and oil equipment has become common. An amnesty was granted in 2009 and many militants gave up their armed struggle, but the matter has not been put to rest. In September 2011, the Joint Military Task Force in the Niger Delta issued an ultimatum to those in possession of illegal arms. Despite this, as recently as February 2012 attacks were launched against Agip facilities.

The cost to the federal government keeps rising. In addition to direct security costs, there is the recently approved "Transitional Safety Allowance" for ex-Niger Delta militants paid on top of the N 65,000 per month that each militant has received since the start of the amnesty program. This is despite the significant structural funds flowing into the Delta through the Ministry of Niger Delta, the oil producing companies' contribution of 3% of their annual budgets to the Niger Delta Development Commission (NDDC); the share of the Federation budget for the oil producing states; and the 13% derivation from oil revenues enshrined in the 1999 constitution. Development agencies also contribute their share. For example, in September 2011 the EU announced plans to spend € 200 million on projects in Nigeria, most of them to be carried out in the Niger Delta.

Viewed from this perspective, the cost of oil has proven to be extremely high not only environmentally but also socially, politically and economically. This has led to a broad-based movement in the Delta region (and beyond) that calls for the remaining oil to be left in the soil and for a commitment to environmental and social restoration.

environmental law and implementation

The legislature and government have responded to the environmental problems by putting in place a plethora of regulations and acts.[8] These are spelled out in the *Oil & Gas Technical Background Paper* to this

[8] These include regulations under the Ministry of Petroleum/Department of Petroleum (DPR):- The Minerals Oil (Safety) Regulations 1963, The Petroleum (drilling and production) Regulations 1969 as amended (1993, 1979, 1995 and 1996), Associated Gas Re-injection Act 1979, as amended (1985); and others on Environment Impact Assessment Act 1992 (EIA), former Federal Environmental Protection Agency 1988 (FEPA), the Federal Ministry of Environment 1999 (FME), National Oil Spills Detection and Response Act 2006 (NOSDRA), The National Environmental Regulation for the Construction Sector of 2011 (NESREA).

chapter[9]. Notwithstanding the comprehensive nature of these laws and regulations, compliance is seriously lacking. In our view, there are at present too many regulators and agencies in the area of environmental management, resulting in conflicting competencies between e.g. DPR, NOSDRA, NESREA and the Ministry of Environment. Secondly, penalties for violations are extremely low and the chance of even these penalties being levied is low. The most important example is that of gas flaring, which is 'penalized' at N 10/mcf. Failure to submit or comply with an EIA costs between N 50,000 (US$ 320) and N 1 million (US$ 6,400). Critically, Nigeria has no environmental right-to-know legislation and data on oil spills held by DPR and NOSDRA are kept confidential. This makes pursuing complaints against companies more difficult. The lack of funding and low capacity of the agencies, combined with the misapplication/lack of priority of funds allocation, further reduces their effectiveness.

the link to renewable energy development

Despite being a major petroleum producing and exporting country, Nigeria has for decades imported refined petroleum products for domestic consumption. Given the acute shortage of electricity in the country, it is not surprising that the potential of bio-energy is being explored. The government has opened up the market for imported ethanol until enough domestic capacity exists to meet demand estimated at 5.14 billion liters per year.

Since 2001, investors have responded by investing over US$ 3.86 billion in the construction of 19 ethanol bio-refineries and 10,000 mini-refineries and feedstock plantations for the production of over 2.66 billion liters of fuel grade ethanol per year. A further 14 projects are in the offing. It must, however, be noted that of the 20 pioneer projects, 4 are in the conception phase, 8 in the planning phase, and 7 under construction with only 1 operational.

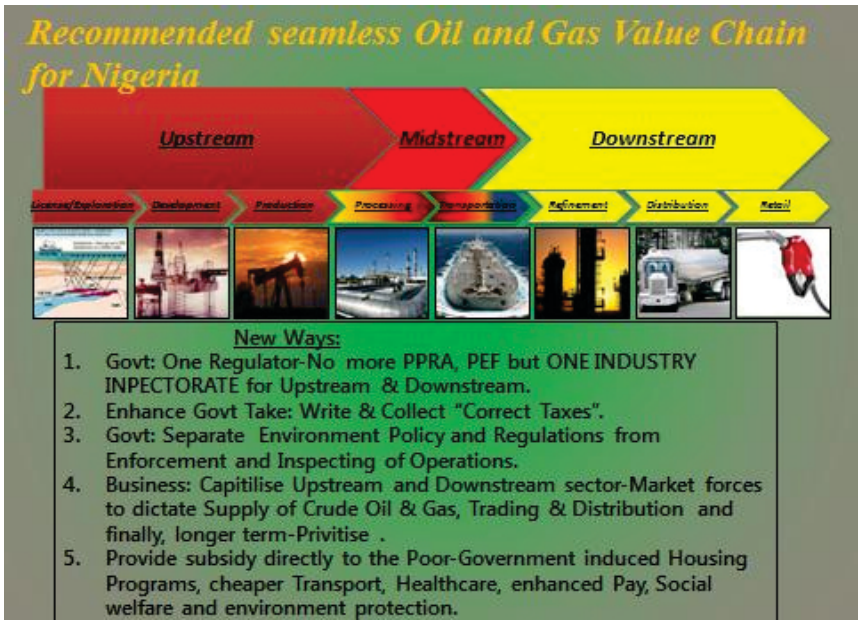
There is at present no debate in Nigeria on the conflict between large-scale biomass production and the drive to increase food security. As a result, it remains unclear whether Nigeria can afford to significantly increase its production of food crops that can be used for bio-energy production, such as cassava, sugarcane, soya beans and palm oil. While the use of biomass can speed up the transition from a reliance on oil to renewables, this should be carefully considered and steered.

conclusions and recommendations

This concluding section provides top-level recommendations which if implemented can ensure the efficient management of the energy sector and steer the transition to a green economy. It builds on the analysis presented above. It also draws on an extensive review of best practice around the world, which can be found in the accompanying *Oil & Gas Technical Background Paper*[10]. These recommendations when implemented could achieve the following:

a. Accelerate the development of the domestic energy market;
b. Provide for the effective integration of energy supplies;
c. Significant scaling-up of renewable energy for electricity for both grid and off-grid distribution;
d. End gas flaring through a harmonisation of gas management and electricity sector development;
e. Structured plans for the transformation away from oil & gas dependence towards renewable energy supplies; and,
f. Streamline governance and increase support from the Nigerian people.

[9] See www.ng.boell.org
[10] See www.ng.boell.org

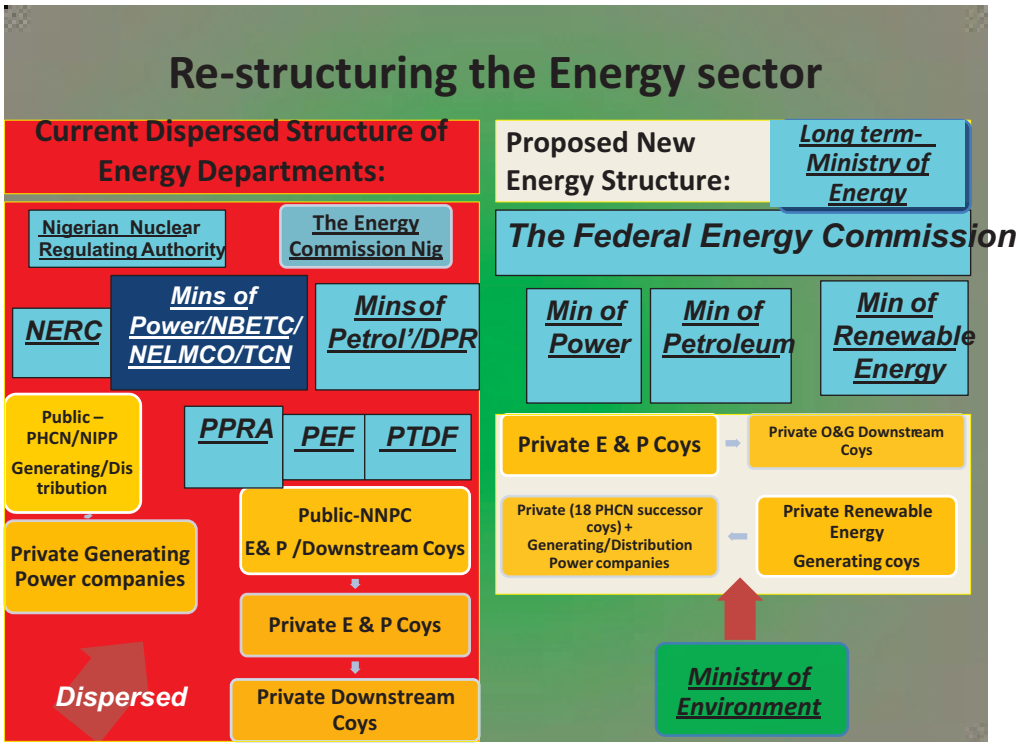


review the structure & management of the energy sector

There is an urgent need for a single energy regulator, as well as a realignment and harmonisation of existing policies, legislation, structures and organisations. A comprehensive energy supply & demand policy and plan should be drawn up, taking a long-term (100 year) view. This should be followed by a comprehensive recasting of regulations and legislation. At present, in the absence of a single energy regulator, the Presidency has become de facto coordinator. The President provides approval to most petroleum sector decisions and the Vice President is chair of the Presidential Task force on the Power Sector. Notwithstanding the importance of the sector to the nation's economy and security, this is not a sustainable way to govern the sector. The ultimate goal is to supply adequate energy to support growth and development of the economy from viable sources and to have a one-stop shop that assesses what infrastructure is necessary for such to happen that can lead to industrial development. Thus there is a need to have central coordination for planning of sources of energy supply and for managing demand in Nigeria, from the current dispersed supervisory authorities.

provide for an effective management structure to transform Nigeria's energy sector

At present the management of Nigeria's energy sector is dispersed. The proposed new structure that in our view is able to meet future challenges and should be capable of both planning and implementing the new vision looks as follows:



conduct long-term sustainable energy planning

Long-term planning and policies to help guide the transformation to a future-oriented energy system require a more integrated approach than the one currently employed. Policy makers and regulators need to consider the need to provide access to sustainable energy to all Nigerians. This cannot be achieved through the expanded grid currently envisaged. The first and foremost responsibility of policy planners is to secure the future provision of sustainable energy to meet demand while considering the potential of energy efficiency in reducing this demand. Energy planning should reflect factors like population growth, the functioning of energy markets, the renewables potential, estimated demand, prices and futures, issues concerning "market power."

Integrated "sustainable" energy planning systems incorporate concerns over the environmental impacts of energy consumption and production, including climate change. Stricter regulation of the energy sector has in many countries led to the setting of (performance) standards and emissions reduction targets for CO2 and other greenhouse gases.

Crucially, the future of Nigeria's oil and gas production, which may have peaked already, in light of the tremendous problems summarized in this chapter will need to be reflected in the plan.

better governance - the regulatory role of government and sources of corruption

Nigeria's public institutions are weak and lack in capacity. In the energy sector, this has sadly enabled private and company rent seeking through bribes, contract inflation, and the like. Those exceptional civil servants who do not engage in this business are few and far between. The petro-dollars have infected the political system and accusations of vote buying and influence peddling are common. As a result, Nigeria's international reputation has been tarnished and the country's development hampered. Transparency International ranks Nigeria as one of the worst countries to do business in globally.

When in January 2012 President Goodluck Jonathan suspended the fuel subsidy, effectively doubling the

price of gasoline, this became a rallying point for Nigerians fed up with corruption and the misuse of oil revenues against a backdrop of grinding poverty. A probe conducted by the National Assembly has unearthed large scale fraudulent malpractice. It is estimated that more than 2 trillion Naira (US$ 12.6 billion) was paid to fuel importers in 2011 to cover the difference between market costs and state-regulated prices, representing almost one third of a N 4.5 trillion government budget. Hence we support the gradual removal of the subsidy, assuming mitigating measures are put in place to protect citizens from undue effects of these anti-corruption efforts.

How then to invest the trillions thus liberated? The demands will be many. In addition to the investment program outlined in this report that will enable a transformation to a green economy through renewable energy investment, we wish to draw attention to the fact that Nigeria's education system is in trouble. This is leading to a brain drain with increasing numbers of students traveling abroad. The quality of infrastructure, the admission processes, general funding, corruption, poor governance systems and outdated curricula are major problems and, as a result, the skill level of graduates is very low. This undermines the long-term economic development and social cohesion in the country.

promoting community peace – increase the stake of people in natural resources

Some have taken the position that mineral resources should be vested in the communities, as opposed to the federal government. It is our view that a substantial share of the economic rent derived from natural resources should be allocated to the host communities through a more transparent allocation system, using the global accepted practice of royalty rent. Royalty is paid on a gross basis, following a concept of compensation for the destruction and depletion of the endowed land. It is suitable compensation for destruction or reduction of the value of land from exploitation and production. We recommend this structure to compensate communities that are affected by exploration on land and in shallow waters. This royalty of 18-20% would replace the 13% Derivation. Government should continue to earn what is due from taxation of profit from operations, which constitutes the greatest share of economic rent. This policy should also be applicable to other (solid) mineral resources. This system is more transparent, auditable by all stakeholders involved and meets global standards.

the need for privatisation

We have shown how the current role of the government as both investor and regulator is problematic and detrimental to good governance and economic development. With some caveats we support the gradual, transparent and structured privatisation of government holdings in the sector. This gradual transfer of the management of resources from the public to private sector also transfers sources of capital for business growth. At present the government pays a 57% equity share of joint venture budgets through cash amounting to between US$ 4 and US$ 5 billion annually. In addition, it covers NNPC's capital and major operational costs. The combined total of US$ 6 to US$ 8 billion is derived from current revenues earned, with limited debt or multilateral projects financing. This leads to a direct competition in the national budget with other sectors, which has at times hampered sector investment and investment in other sectors. Hence, there is a need to privatise the petroleum sector. This will hopefully also lead to more transparency and fiscal discipline, as well as improve tax collection. The pitfalls of privatisation are well known in Nigeria. Some privatised companies have been surrounded by controversy and the exercises conducted by the Bureau for Public Enterprises (BPE) and the authority of the National Council on Privatisation have been questioned. As a result some of the sales have been revoked by subsequent governments. The requirements of core investors having technical, financial and managerial acumen need to be strictly met. Corruption and partisan interests are indeed a problem, but the system has some way of correcting itself as the successes in telecommunication and aviation show.

funding renewable energy development

There is need for a Nigeria Renewable Energy Development fund. This fund should replace the newly

created Subsidy Reinvestment and Empowerment Programme (SURE-P), which was established to monitor the use of the subsidies accruing following the liberalisation of the petrol price. The federal share of the partial subsidy removed in January is reported to be about N 15 billion, which is 47% of the 3-tier distribution for which SURE-P is responsible. Unfortunately, the SURE-P plans appear to duplicate the functions of existing public institutions such as the building of roads, schools etc. Instead, the fund could focus on providing renewable energy access, thus complementing the national grid and delivering on government's promise to provide power for all Nigerians. In addition, the CBN should create a Renewable Energy Intervention Fund. If combined with fiscal incentives for renewable energy development, this would adequately deepen funding for the development of the sector. Finally, the potential role of the Future Generations Fund, which is part of Nigeria's Sovereign Wealth Fund, in support of this transition should be further explored.

transition from a fossil dependent to a green economy

Finally, we have developed an initial transition plan for the sector, annexed at the end of this chapter. While not fool-proof it provides a simple guide that shows the steps to be taken, starting today. It shows how integration will accelerate a transition to a green economy following international 'best practice' in energy and renewable energy legislation and organisation, fiscal policies, technology, and financing. By so doing the national grid with a current electricity capacity of about 6,000 MW, dependent for two thirds on oil and gas can be scaled-up to 200,000 MW by 2030. The grid will be for 60% supplied by renewable sources (including hydro), natural gas will provide 30% and the remaining 10% will come from oil. Taking into account the dynamics in population growth and the need for greater deployment of renewable energy in rural areas, large parts of the population not served by the grid will be supplied with off-grid renewable energy solutions.

Please also consult the *Oil & Gas Technical Background Paper* which contains the wider background, facts and figures supporting the proposals made in this chapter. The background paper is available on www.ng.boell.org under Green Deal Nigeria.

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annex – **transition steps for Nigeria from fossil fuel to green energy economy**

Recommended Actions
Step 1 - immediate to short term: • Create the Federal Energy Commission (FEC), by appointment of an independent body of commissioners; out of existing regulators. • Establish integrated energy planning for demand and supplies; R&D centers. • Fed Ministry of Environment (FME), or a suitable agency like the Climate Change Commission is to establish measuring standards of GHG and reporting plus emission targets and also for each sector target. Climate Change Commission/FME is to utilize existing donor technical support from international agencies such as EU's Global Climate Change Alliance, DFID, hbs etc. to design and implement policies. • Roll-out of integrated energy policies, fiscal policies and incentives for renewable energy for Nigeria in tandem with oil and gas. • Conclude privatization plans of key sectors of energy; power & petroleum • Embark on mass education of public/civil society on Climate Change, deforestation, flooding. • Adopt adaptation programs at national, state and local levels as well as at regional level. • Implement/support regional strategies on climate observation, climate change measurement, impact, vulnerability and adaptation strategies. • Embark on energy efficiency plans and programmes at all levels; introduce intelligent electricity grid with control systems that monitor peak demand and controls various sources of power feeding into the grid; reassess building codes. • Introduce climate related quality controls through the Standard Organisation of Nigeria. • Develop skills base for renewable energy development in R&D and RE technology by re-assessing Petroleum Trust Fund programmes and Ministry of Education curriculum.
Step 2 - short to medium term: • Accelerate the gas flare reduction plans, develop the gas corridor grid and put in place a major gas pipeline network across the county or as conceived in the Gas Master Plan (GMP), similar to WAPCO. • With or without PIB, implement immediately the policy of open access to gas ownership, pipeline transmission and distribution. • Subsidy on petrol and gas should be tied to the power MYTO system-an integrated approach. • Revise the weak elements in existing contracts and Joint Operating Agreements and Production Sharing Contracts with IOCs in the light of new energy sector management. • Strengthen national R & D studies in RE and oil and gas reservoir management and planning (currently under the control of IOCs for their export use). • Manage waste from landfills and incineration; waste transport efficiencies; waste prevention. • Implement new housing policy & design to target solar use.
Step 3 – medium to long term: • Increase spread & intensity of RE energy technologies by having access to intellectual property and own R & D. • Create a Green Fund and create a domestic carbon market.

Energy Access for All:
The role of clean energy in alleviating energy poverty

by Huzi I. Mshelia

Imagine… millions of women sitting down to read books with their daughters for one hour each night. Grinding and fetching of water made easy by renewable energy from household or community installations independent of the national grid, harnessing abundant energy from sun, wind and water. Cooking food on clean cook stoves reducing firewood consumption by 70 per cent.

Imagine… millions of young men not leaving behind their ancestral lands as their lands are irrigated by solar-powered water pumps, enabling the men to grow food, to process, eat and sell it.

Imagine… a modern transport sector with a sophisticated public transport system, both in-town and across the country, and all vehicles fuelled by compressed natural gas.

Imagine… millions of jobs created in the renewable energy and domestic manufacturing sectors. Small enterprises building appliances for use by Nigerian farmers, craftsmen, market women.

Imagine... this growing industry thriving beyond the point where oil reserves run out, because in 2012 decisions were taken to foster a green economy that is socially inclusive.

introduction

Despite Nigeria's abundance of fossil and renewable energy resources, Nigerians still experience acute energy poverty: they either lack access to modern efficient energy sources or struggle with the inadequate supply and poor quality. Close to 95 million people are fully reliant on traditional wood stoves for cooking, with the attendant health implications[1] and a large but unknown number of especially urban households rely on generators for their electricity needs. This lack of access to energy is directly affecting human livelihoods and undermining peoples' aspirations to live a good life, lowering their quality of life and seriously hurting the economy.

The disparity in the demand and availability of energy, and the over-dependence of the economy on the oil and gas sector coupled with a monumental energy waste through gas flaring presents a

[1] Eleri, E, Ugwu O, Onuvae P. (2011) "Low-Carbon Africa: Leapfrogging to Green Future: Low carbon Africa: Nigeria". Online at: www.christianaid.org.uk/resources/policy/climate/low-carbon-africa

paradox for Nigeria's energy economy. Presently, energy - particularly oil and gas - is contributing over 90% of the nation's foreign earnings and 70% of the country's federal revenue and at the same time constitute the single largest source of green gas house emissions, especially from gas flaring in the Niger Delta region[2].

vision for 2020

This chapter shows the prospects for a green economy in 2020. Through the deployment of clean energy, the current energy access challenges can be resolved. The chapter specifically addresses the role of both advanced technology and locally appropriate technologies in achieving energy access for all and show what it will take to make Nigeria energy secure by 2020 with reliable, modern energy services that are affordable and efficient. The grid does not necessarily provide these services. We envision large-scale utilisation of renewable technologies and products for households, small-scale businesses and primary health centers, and a modernized transportation sector propelled efficiently by compressed natural gas and renewable electricity instead of diesel. This vision can be realized with sufficient political will, the appropriate investment environment and the involvement of the people who share this vision of a prosperous Nigeria that is substantially green by 2020.

problem statement

Statistics optimistically state that about 40% of the population has access to electricity from the national grid[3]. But while electricity demand is estimated at 95 GW for loads connected to the national grid[4], the national utility delivers a paltry 3 GW to a population of about 160 million people. Vision 2020, the government's development plan formulated in 2010, envisaged electricity demand to be 35 GW in 2020. Other government sources state that by 2030, with higher projected GDP, electricity demand could reach 192 GW[5]. For the country to attain the ambitious national development targets set by Vision 2020, the complexity of energy poverty has to be urgently addressed in a carbon-constrained manner, to achieve high economic growth rate, at a low carbon trajectory[6].

background

The current government reforms in the electric power sector are not necessarily designed to create access to energy for all. Whilst the government is rightly concerned with increasing the amount of megawatts available on the national grid, it seems doubtful whether this will translate into a substantial expansion of the national grid because demand for power is likely to outgrow any potential megawatt increase as the middle classes of Nigeria start to develop consumer behavior with high electricity demand. Added to this is the problem of the technical dilapidation of the

[2] Sambo, A (2008): *Matching Electricity Supply and Demand in Nigeria,* IAEE Energy Forum, Newsletter quarter 4 available at www.iaee.org/en/publications/newsletterdl.aspx?=56

[3] Eleri, E, Ugwu O, Onuvae P. (2011)

[4] Global Climate Network: "Investing in Clean Energy" (2010)

[5] See footnote 2

[6] 5.5 kWp Solar PV Plant at Laje in Ondo State, picture by Prof. Sambo, Energy Commission of Nigeria

current grid. At the moment, despite its ambitious targets, the power sector reform is paying little attention to off-grid, decentralised energy sources for millions of Nigerians who are not connected to the grid and do not live in direct proximity to it. Any meaningful development vision for Nigeria needs to provide them with better energy supply to improve their livelihoods.

"I feel bad because the Government is the one to provide all these things but even the people importing generators are bribing Government officials but if Government can make the electricity standard, there won't be any need for generator. … This generator affects us negatively and you know it's the one that is causing this acidic rain that is damaging things."

C2DE, 16 – 19, Male, Lagos Semi Urban[7]

Amidst the various government policies and actions there is too little practical strategy for low carbon development that addresses clean energy generation and green development. Some policies do touch on improving the efficiency of the management of energy resources. While renewable energy holds great promise for enhancing energy availability and greater prospect of a green development, the investment environment is not sufficiently conducive to attract the required finance to the sector.

It is possible to significantly address energy poverty by deploying clean, renewable energy resources. Such a shift will facilitate a faster transformation of the rural economy, improve human livelihoods, and alleviate poverty. Importantly, it will catalyze a transition to a low carbon development path, opening the doors for a green economy by 2020. For that to happen however, the government must formulate a clear-cut strategy that seeks to improve the livelihoods of Nigerians through the delivery of clean and affordable energy. This requires well-incentivized investment packages for renewable and sustainable funding arrangements from the private sector and sometimes, government. Nigeria needs a high-quality research and development system to localise technology that is people-driven through robust public participation. Furthermore, strong regulations for the standardisation and quality control of renewable technologies, local capacity and training programs that will support the scaling-up and diffusion of these technologies are needed.

Growing a renewable industry in Kenya

When the Kenyan government started an incentives package to scale up private sector investment in solar and wind energy, Chinese solar companies had a field day. Unfortunately, a substantial proportion of imported panels were of low quality. A backlash resulted and the perception of people was that renewable energy was 'low quality power.' When the Kenyan Standards Organisation started to regulate the market in 2006, low-quality imports came to an end. The domestic solar industry has boomed as demand rose.

The Nigerian government must devise a strategy that aims for people to identify with, and share its vision. The Vision 2020 needs a participatory review to turn it into a vision for sustainable growth within the limits of a climate constrained world, and a translation into some national movement, sustained by the belief in a shared present vision and common bright future. A shared identity can

7 *2020 - Young Nigeria's Perceptions*, research commissioned by hbs, May 2012

be achieved through robust public participation in decision–making. This, however, requires emphasis on social dialogue and inclusiveness in policy-making.

> *"We will prefer our community to provide electricity … because it will guarantee us more constant light but if it's from the Government, the reverse will be the case."*
>
> *C2DE, 16 – 19, Male, Abuja Semi Urban*[8]

Nigeria's renewable energy resources

Nigeria's renewable resources are as enormous as they are diverse. The table below[9] gives a summary of the potentials identified.

ENERGY SOURCE	CAPACITY
Large Hydropower	11,250 MW
Small Hydropower	3,500 MW
Fuel wood	13,071,464 ha
Animal waste	61 million tons / yr
Crop residue	83million tons / yr
Solar radiation	3.5-7.0kmh / m^2/ day
Wind average at 10m height	2 – 4 m^2 annually

hydro-power

Despite the abundance of this energy resource, Nigeria is yet to fully harness the enormous potential of water. With over 276 potential sites with a combined capacity of about 3,500 MW for small hydro-power development, only a few pilot projects have been initiated leaving the substantial part unexploited.[10] Some of the reasons for this include limited domestic hydro-power technology, a weak hydrological data base of rivers, limited access to appropriate technology to undertake hydro-power projects, existing patents on small hydro technology, and other barriers on the transfer of technology. It must be noted that while mini and small-scale run-of-the-river systems can be operated with little environmental impact, large-scale hydro-power dams are increasingly being resisted. They have become associated with environmental and social problems and carry high up-front investment costs.

solar

Nigeria has an annual average of daily solar radiation of as high 7 kWh/m^2/day in the northern border region and about 3.5kWh/m^2/day in the coastal regions. This means that the annual average of daily hours of sunshine varies from 9 hours in the north to 4 hours in the south. At a medium radiation intensity of 5kWh/m^2/day and convention efficiency, solar radiation of 1% of the land areas of Nigeria will generate approximately the daily energy equivalent of the energy from a 192,000 MW gas power plant working at full capacity for 24 hours a day[11].

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8 *2020 - Young Nigeria's Perceptions*, research commissioned by hbs, May 2012

9 Energy Commission of Nigeria: 1st Energy Lecture Series, 2005

10 *Renewable Energy for Rural Industrialization and Development in Nigeria*, UNIDO- African Regional Centre for Small Hydropower, Abuja (2003)

11 A.O. Yusuf, Zarma A (2009): *Introduction to Clean Energy in Nigeria,*(unpublished) study commissioned by ICEED on

Despite this massive potential, solar energy utilisation is presently limited to small-scale pilot projects by governments and individuals across the country. Some of the constraints to large-scale deployment have been the high initial cost of acquisition coupled with a lack of funding and the long recovery of investment period, a lack of knowledge of the technology, and an unwillingness to try out new technology.

Consumers generally view the upfront costs of solar equipment as too high, which discourages its utilisation. This might in part be due to the high import cost of the equipment. The lack of a clear electricity tariff structure for renewable energy so far has not helped investment in the sector. The potential of solar energy to address Nigeria's energy poverty, particularly in the northern region, is promising.

The fact that the European Union supports an initiative like the Desertec Project, which seeks to utilise solar energy across the Sahara desert to generate electricity for export to Europe, should inspire Nigeria to check whether the energy poor north could be turned into a domestic or even regional power exporter.

Deployment of solar in the northern region can take various forms, such as solar cooking to address the menace of deforestation, and create jobs in solar powered irrigation and agriculture as well as in manufacturing of electrical appliances that run on solar power. In any scenario – be it small or large-scale utilisation of solar, replacing oil or gas to generate electricity would contribute to the fight against climate change as it reduces CO2 emissions. Despite this opportunity, the absence of political will to pursue such ventures threatens to perpetuate a vicious cycle where poverty, youth unemployment and conflict pose increased investment risks, thereby making the expansion of energy services even more difficult.

wind

The wind energy potential varies with the wind speed. The quality and velocity of the wind particularly in the northern border regions and some coastal states can support wind farms projects. Already some wind powered water pumps are in use in areas of Sokoto and Katsina States. In a move to stimulate private investment in wind energy, the Federal Government through the Federal Ministry of Science and Technology began a Wind Energy Mapping Project in 2002 to identify potential sites with sufficient wind resources for exploitation. Given the availability of data and the lower investment cost of wind (compared to solar), it is surprising that this sector has not yet reached substantial scale. The reasons for this under-development may lie in the lack of awareness, promotion and practical government support in form of subsidies or substantial facilitation for the import of technology that Nigeria cannot or does not want to produce.



biomass[12]

Wood fuel is the largest source of energy for both the rural population and urban dwellers. This is a direct cause of illegal wood logging that hastens desertification. It also constitutes a major indoor-pollution hazard. Studies have shown that as many as 79,000 Nigerians die each year as a result of smoke inhalation from traditional three-stone cooking fires[13]. These issues alone should provide enough reason for the massive deployment of clean cook stoves. These require less wood, thus reducing deforestation, and improve indoor air quality. They must be an inherent part of Nigeria's national climate change strategy. The Nigerian Alliance for Cook Stoves is championing the expansion of the use of improved cook stoves in households, schools and hospitals. Sustainable funding arrangements are required to make clean cook stoves more accessible to the poor and to develop and control domestic production of stoves.

A major risk to the expansion of clean cook stoves is the government's preference of promoting fuel switching from wood to Liquefied Petroleum Gas (LPG) and kerosene, rather than improving wood stoves. All three technologies still have carbon footprints and must be seen as stop-gap measures until carbon-neutral cooking technologies are fully deployed. However, the immediate and large-scale deployment of clean cook stoves is a win-win opportunity as these stoves also save money for their users. A defined government directive or policy for the use of these improved wood stoves in schools will support the urgently needed expansion of cleaner technologies until carbon neutrality is achieved.

There is at present no debate in Nigeria on the inherent conflict between large-scale biomass production and the need for more food security. It is unclear whether Nigeria can afford to significantly increase its production of food crops, such as cassava, sugarcane, soya beans and palm oil, and convert those for bio-energy. While the use of biomass can speed up the transition from a reliance on oil to renewables, this should be carefully considered and steered. For this reason, concerns with regards to Nigeria's bio-fuel program[14], which focuses on the production of ethanol from cassava and sugar cane, have to be addressed.

The use of bio-diesel for power generation[15] is gaining grounds in remote locations and is being promoted by the Energy Commission of Nigeria (ECN) through its jatropha-to-power project, which has been adopted by some states. The Jigawa State government is currently using jatropha in bio-energy and sustainable land use

[12] Cook stove pictures by Yahaya Ahmed, DARE (Development Association for Renewable Energy) Kaduna
[13] Ewah Eleri et al (2011)
[14] Draft National Bio-fuel Policy- NNPC (2007)
[15] Jatropha project at Yardan-Kangiwa, Jigawa State, picture by Huzi Mshelia

management, while some telecommunications companies have started using bio-diesel to power their repeater stations. While the use of jatropha for biofuel can be promoted in the north like the mixed-cropping model applied in Jigawa State, we are highly critical of using cassava and sugarcane for biofuel production because of its apparent threat to food production.

Food or diesel?
Imagine Nigeria growing enough jatropha to substitute the diesel its truck fleet uses. How much land would be needed to grow this jatropha? Who owns that land and why would the owners choose to cultivate jatropha? How to prevent conflicts over land tenure with communities? What are the potential environmental impacts of large-scale production?

The experiences in Mozambique with growing jatropha on a large scale have been mixed. Some projects have simply proven to be uneconomical. It takes many years before plants can be harvested for biofuel production and yields can be low. Like other crops, the plants are susceptible to disease and pests and need careful cultivation including water supply. What started as a boom has ended in a bust.

It is clear that projects must have their potential environmental and social impact - specifically their impact on food production - assessed in consultation with the communities.

energy policy overview

Access to energy is crucial in reducing poverty. Given Nigeria's enormous renewable energy resources, pertinent questions that require further deliberation are:

- How would Nigeria unleash these enormous clean energy potentials to transform its economy to a socially inclusive and gender-sensitive low carbon economy that will assist the attainment of the Vision 2020?

- What is required to scale up the development and deployment of renewable energy technologies?

- What role can the private sector play in the mobilisation of financial resources for clean energy development?

To respond to these questions, a brief overview of existing policies and plans on energy is required. That will allow us to identify the reforms of policy objectives, gaps and options necessary for Nigeria to secure access to renewable energy for all.

The **National Energy Policy** (NEP) of 2006 sets out government policy on the production, supply and consumption of energy reflecting the perspective of its overall needs and options. The main goal of the policy is to create energy security through a robust energy supply mix by diversifying the energy

supply and energy carriers based on the principle of "an energy economy in which modern renewable energy increases its share of energy consumed and provides affordable access to energy throughout Nigeria, thus contributing to sustainable development and environmental conservation"[16]. Importantly, the national policy already outlines the key elements for development and application of renewable energy as:

- To develop, promote and harness Renewable Energy (RE) resources of the country and incorporate all viable ones into the national energy mix
- To promote decentralised energy supply, especially in rural areas, based on RE resources
- To de-emphasise and discourage the use of wood as fuel
- To promote efficient methods in the use of biomass energy resources
- To keep abreast of international developments in RE technologies and applications.

In an effort to translate the RE component of the NEP into an actionable plan, the Energy Commission of Nigeria (ECN) in 2005 developed the **Renewable Energy Master Plan** (REMP) to complement the NEP, which reiterated the government's pledge to support the development, demonstration and implementation of RE sources for both small and large applications. To create the appropriate enabling environment for the promotion of RE, the REMP identified the need for appropriate financial and legal instruments, technology development, awareness raising, capacity building and education as the strategic areas to be paid attention and further sets specific goals for each of those areas. The REMP aims at a 10% RE contribution to the national energy mix by 2020 through the adoption of a renewable portfolio standard (RPS). A RPS is a requirement for electric utilities to supply a specific amount of electricity to customers. This can be achieved through the purchase of renewable energy certificates from suppliers with a larger share of renewables in their energy mix. Other measures considered are the creation of innovative fiscal and market incentives to grow renewable energy industries, as well as preferential customs duty exemptions for imported renewable energy technology components.

However, the lack of implementation of the master plan has meant that the 10% target of renewable energy mix in the energy supply cannot be achieved. The REMP is presently being subjected to a review, likely resulting in the setting of new targets. It will be essential that any future targets set for the attainment of a RE energy mix should be backed by legislation to ensure compliance, which is presently lacking.

Similarly, the **National Policy and Guidelines on Renewable Electricity** was produced in 2006 with the main aim to expand the market for renewable electricity by 5% of the total electricity generation by 2016. The strategy for achieving this target included: encouraging local manufacture and assembly of renewable energy components, provision of subsidies, and establishment of technical standards for RE components and introduction of feed-in-tariffs. The strategy is yet to be fully adopted as the reforms in the energy sector are still ongoing and decisions on tariffs and subsidies for renewable energy and other incentives have not yet been taken.

Another government policy developed for the promotion of renewable energy is the draft **National Bio-Fuel Policy** of 2007, initiated by the Nigerian National Petroleum Corporation (NNPC), which seeks to establish a bio-fuel industry that will optimally utilize agricultural products to improve the quality of automotive fossil-based fuels in Nigeria. The 2020 target is to blend 10% of fuel ethanol into gasoline to achieve a fuel known as E10. Constraints in the implementation of this policy stem

[16] National Energy Policy (NEP), 2006

from lack of consultation, incoherence amongst government agencies that drive the policy and from skepticism of its implications for the national food security program. Like other similar policies on energy, the absence of political will to address the potential constraints of expanding this energy source is its greatest weakness.

The Energy Commission also developed a draft **National Energy Master Plan** (NEMP) in 2006. The NEMP acknowledged the imminent dangers of the fossil fuel driven economy, its global environmental concerns and the expediency of adopting a less carbon intensive and environmentally friendly development pathway, and recommended urgent action to diversify the economy and create a sustainable energy supply mix.

A **National Gas Master Plan** of 2008 envisages a wholesale transition to decentralised privately held electricity generation gas plants from the erstwhile public power utility. The plan also aims to stem the huge waste associated with gas flaring and to put to more productive use the nation's large gas reserves. What the Gas Master Plan does not clearly mention is that the utilisation of Compressed Natural Gas (CNG) can play a major role in transforming the nation's transportation sector if adopted on a large scale. Clear benefits are evident, for example in the Lagos State Bus Rapid System (BRT), which recorded a 13% reduction in CO_2 and 20% in other green house gas emissions[17].

The **Nigerian Atomic Energy Commission** was established to explore Nigeria's nuclear energy potentials for peaceful purposes. Given the expected expansion of electricity demands by the growing population, the Energy Commission has called for an activation of a Nigerian nuclear programme and the Nigerian Atomic Energy Commission is already undertaking preliminary steps. This is however curious when considered against the background that the Vision 2020 does not include atomic energy in its proposed energy mix. After the nuclear accident in Fukushima, Japan, and given the long-term huge costs of producing atomic power, pursuing the nuclear path seems like an outdated strategy. Even though nuclear is said to contribute 16% of global electricity, high cost and liabilities, major safety and waste management issues, exacerbated by the weak regulatory environment, make nuclear energy less attractive for the timely provision of energy access to the poor. Unsurprisingly, countries like Germany are gradually abandoning nuclear energy.

addressing energy poverty

The energy scarcity in the midst of abundant energy resources in Nigeria is a complex irony. Energy production and consumption are intrinsically linked to the attainment of economic and human development. The country at present depends on expensive imported fuels and petrol-powered electric generation that is carbon intensive. It further depends on large hydro power plants that are susceptible to climate vagaries affecting water availability and thus electricity generation. Whoever can afford to buy an imported electric generator would rely on this carbon intensive source of electricity, which costs the country millions of dollars and substantially contributes to emissions of green house gases.

Climate change measures undertaken by developed countries as part of their obligations under the Kyoto Protocol will ultimately force changes in oil producing countries as well, making a shift to

[17] Ewah Eleri et al (2011)

alternative energy imperative. To remain competitive, reforms introducing efficiency in the production and consumption of oil are required, as well as reforms in the area of oil exports and technology applications.

While some government energy policies specifically provide for increasing the use of renewables in the national energy mix, nothing much has been put in place to make this happen. This section examines some of the challenges for the present low level of the exploitation and utilisation of renewable resources and what it will take to increase energy access especially at the local level. The section also examines the gaps that currently exist within the policies and laws which make it impossible to transit to RE. Finally, the question will be asked, what do Nigerians want most, and how can the policy framework meet peoples' needs?

lack of an appropriate legal framework

Nigeria lacks legislation that specifically addresses climate change and provides a clear–cut strategy for low-carbon development that will increase energy savings and efficiency. The Electric Power Sector Reform Act (EPSRA) of 2005 provides the legal basis for the on-going reform in the power sector but it is doubtful whether the reforms will bring electricity to the millions of Nigerians who are currently not connected to the grid in the foreseeable future. Although the Act also created the Rural Electrification Agency to address rural energy challenges, the enforcement and implementation of the provisions of the law have not been effective. Similarly, most of the energy policies do not have the force of law and cannot provide a basis for legal sanction in the event of non-compliance. Frequent policy changes by successive governments and unwillingness to deal with vested interests and corruption have added to these challenges.

The EPSRA established the Nigerian Electricity Regulatory Commission (NERC) and mandated it to reform the Nigerian electricity market and to establish an Electricity Supply Industry (ESI) with several competing generation and distributing companies, plus a regulatory system to ensure equitable standards and a level playing field. In the electricity supply industry, electricity would be traded between several market players under the regulatory supervision of NERC. Considering that market reforms and the economy of supplies are not by themselves supportive of renewables, deliberate measures must be taken to reconcile commercial and social objectives of electricity supply through the effective allocation of subsidies that lower initial capital investments in renewable energies[18].

financing

The infrastructural decay in Nigeria requires a massive injection of funds. A 2011 report by the International Centre for Energy, Environment and Development (ICEED) estimates that about US$ 200 billion will be required to improve Nigeria's infrastructure for power, transport and water[19]. The ICEED report further states that about US$ 32 billion will be required to meet the cost of power generation from hydro-power and gas alone in the next ten years. The government also expects to generate about 35,000 MW in the next ten years. In 2010, the government appropriated US$ 1.05 billion for the power sector, which is too low compared to the need. It was intended for small hydropower development and the rehabilitation of three gas plants. It is not likely more public funds

[18] A.O. Yusuf et al, 2009

[19] Ewah Eleri et al (2011)

will become available without a shift of direction in government's energy policy and implementation.[20]

While currently funding is predominantly public, private sector investments will be required to achieve the desired change. Domestic financial institutions have so far been reluctant to fully participate in the sector because of the absence of a tight legal framework and perceived high risks. Other impediments contributing to a lack of private sector financing are the limited technical capacity of domestic financial institutions to appraise energy projects and the inability of most project developers to draw up comprehensive and convincing business proposals that will secure credit for new projects from potential lenders. The lack of competition in the power sector also inhibits investments as the present tariff structure, which currently locks in on high-carbon energy does not guarantee adequate investment returns in renewables. It is noted that NERC has concluded its technical preparations for implementing a Feed-In Tariff (FiT), but it is doubtful whether investors will show interest where recouping costs takes 10 to 15 years.

The injection of US$ 3.3 billion (N 500 billion) by the Central Bank of Nigeria under the Power Fund for investment in electric power projects through the Bank of Industry (BOI) as credits to banks at a maximum interest rate of 7% for loan disbursement with a tenure of 10-15 years finally provides some additional source of funding. The BOI/UNDP Energy Access Programme in Nigeria also seeks to support the expansion of renewable energy resources and access.

However, there are signs that the private sector is turning its attention to clean energy, one of them being the establishment of the Strategic Sustainable Group, an initiative of the Nigerian Bankers' Committee aimed at introducing sustainability in their banking operations and integrating societal and environmental considerations in their financial dealings. The Access Bank's solar energy pilot project - seeking to provide small financing 'hubs' for communities to meet their energy needs - is one example of the new thinking of potential private sector players. Such private sector financing may also be used to increase access to small-scale technologies, like the clean cook stoves and other micro-household appliances, to increase their acceptance and enhance their marketability. Private funding should also be available for the development of small hydropower plants, household technologies, and the promotion of solar equipment for small entrepreneurs.

> *"If the community contributes money it will enable the community to go and meet the manufacturer of light to help build the light fast for them"*
>
> *C2DE, 16- 19, Female, Enugu Rural*[21]

information, research and development

There has been a lack of publicly available data and information on the clean energy potential in Nigeria and potential new players in the sector lack the basic information upon which to make business decisions. The generation of reliable information and effective management of such information are paramount for good planning and implementation.

[20] Global Climate Network: *Investing in Clean Energy*, 2010

[21] *2020 - Young Nigeria's Perceptions*, research commissioned by hbs, May 2012

institutional arrangements

The lack of implementation of clean energy policies and the lack of coordination among relevant government agencies has created distortions and makes clean energy development more difficult. Inter-ministerial rivalries, overlap of mandates and outright protection of space often send wrong signals to potential investors. The absence of a clear political vision and leadership, weak regulatory institutions and inadequate human capacity, coupled with limited funding by government, all add up to make Nigeria's renewable energy market look dwarfed compared to that of much smaller countries like Kenya. Currently, there is little hope for a quick transition to a green economy. Moreover, questions of social inclusiveness and gender equity do not seem to be fully addressed by government agencies. There is, for example, no program to equip rural women with small-scale renewable energy education and knowledge. The proposed Climate Change Commission under the Presidency would have the potential to increase synergies across ministries, and government agencies at the federal, state and local levels. However, the Bill to establish the Commission remains unsigned by the President.

creating green jobs in Nigeria

The current high costs of energy are borne by individuals, businesses and in some cases by small cooperative associations, which try to provide support to their members. While the state has failed to provide energy to large parts of Nigeria's population, it bears the indirect costs of maintaining a growing population living in a crippled economy with few social safeguards or safety nets. Unless an enabling environment is created to provide financial and technical support for expanding energy access, this challenge will persist.

The global outlook for renewable energy looks promising, with the level of investments rising annually. The international climate negotiations are entering a stage where new binding emissions reductions are being negotiated. It is obvious that renewable energy will play a critical role in emission mitigation. The world will experience a new wave of smart and energy efficient products like energy efficient cars, home appliances and other equipment that will raise the standard of living and improve life expectancy.

If Nigeria creates the enabling environment to fully exploit and develop its renewable energy potentials, many new jobs will be created, alleviating poverty. A 2010 report by the International Centre for Energy, Environment and Development (ICEED) estimates that at least 600,000 new jobs will be created in the hydro-power and gas sectors alone if a low carbon path is pursued[22]. Furthermore, hundreds of thousands of lives would be saved if clean cook stoves were deployed and used in place of the highly polluting traditional wood stoves.

With efficient gas utilisation and cessation of gas flaring, the electric power crisis should improve and industrial production should increase, thus catalyzing export earnings and improving Nigeria's balance of trade. Indeed, political agitations from the aggrieved people of the Niger Delta might reduce if measures to reduce pollution from gas flaring activities were accompanied by activities to halt the degradation of the Niger Delta environment.

[22] ICEED, 2010: *Low Carbon Jobs in an Interconnected World*, www.iceednigeria.org

However, human and technological resources will continue to be required to scale up and enhance RE development. The people, based on their needs must identify local or available technologies that work for them. The choice of technology will depend on the amount of information available and the appraisal of the technology application and its impact on gender. High-tech modern RE technologies already exist, though these are not manufactured locally. Local appropriate technologies will need to be identified, improved and scaled up. Choosing the most appropriate technology will depend on local circumstances, the availability of financing and the people's acceptance of the technologies. It might be futile to attempt to break the dominant position of China and South Korea in the solar panel market. But there will be a large market for appliances powered by solar panels that match what Nigerians need in their households and small businesses, like grinding machines, lamps, irrigation pumps, etc.

Green jobs in South Korea

Hit by the financial meltdown of 2008, South Korea was one of only a few countries that decided to make government bail-out packages dependent on transforming business to serve a more sustainable, greener market.

Eighty percent of government support went to greening the economy with a focus on creating export value. South Korea invested US$ 38 billion over four years aimed at creating 960,000 new jobs. Among 36 projects were the creation of green transport networks, the provision of two million energy-saving green homes and the cleanup of the country's four main rivers.

Public participation will ensure that people are not only consulted, but are part and parcel of the decision making process and choosing what works for them. The power of choice and decision must reside with the people to ensure sustainability. The government must assist the people in making the right choices by setting standards and quality control measures through the introduction of regulations like energy labeling and energy certification schemes. Pilot projects that practically demonstrate concrete energy savings and reduction in energy bills in residential households will inspire people's confidence and help them make informed choices on clean energy technologies.

recommendations

i. Existing policies must be reformed to go beyond mere rhetoric to provide concrete solutions for the poor. Legislative and institutional support will be required to make the RE targets contained in the numerous policies achievable. Therefore, definite legislative provision compelling the compliance with the targeted energy mixes in the REMP should be adopted. As these policies stand today, they are an expression of mere intent, lacking political and legal means of attainment.

ii. A bottom-up approach must be adopted that identifies and meets the people's most pressing needs: solar lamps, efficient cook stoves, solar chargers for their radio sets, for televisions and mobile phones, energizing their small enterprises like hairdressing or barbing saloons, grinding machines etc. The energy policies must provide the enabling environment (through incentives) to encourage the private sector to drive this change. The policies must also ensure that international quality control standards for such RE technologies are well entrenched.

iii. The capacity of existing regulatory and energy training centers needs to be strengthened to supervise this shift to renewables. Training centers like the Science & Technology universities and the

Petroleum Training Institute should integrate training programs on renewable energies in their curriculum. Detailed training for every aspect of the renewable energy industry from assembly, installation and maintenance must be undertaken.

iv. There is a need for detailed planning for each sector of the RE industry in relation to consumers. For example the development of wind energy will certainly require government involvement while the small-scale solar industry could be left for private sector investments with government providing the necessary incentives. The community, private sector and government could jointly or severally undertake the development of off-grid/stand-alone renewable energy projects to increase access for millions of Nigerians who do not access the national grid nor live in proximity to it.

v. The recent protests over the removal of fuel subsidies in Nigeria indicate the desire to express opinion and participate in decision making by the growing middle classes of Nigeria, who care about energy poverty and are capable of swaying policy decision. A similar, but less vocal constituency of retired civil servants, school teachers and local chapters of trade unions does exist in rural and semi-urban areas that can engage the authorities to influence decisions at the local government levels. With constructive engagements by such constituencies, public participation in decision-making will increase and there will be more power in the hands of the people to influence government and private sector. Perceptions of injustice and lack of transparency in governance will be reduced and people can once again identify with government's vision.

vi. Government needs to commit itself to provide sufficient funding for the promotion of research and development in RE and generate reliable data that will guarantee effective planning.

vii. Energy efficiency regulations such as energy labeling laws for electric appliances, mandatory RE requirements in national building codes and transport sector will scale up RE utilisation.

viii. The private sector needs to optimize the business opportunities provided by the energy poverty to compliment and support government in the provision of infrastructure, investments and expansion of low-tech RE products for the larger population who remain off the grid. Such increased private sector participation should be geared towards moving from the feasible to the possible, by creating innovative Nigerian solutions. An approach that is based on more entrepreneurship and more innovation should be adopted.

ix. The formulation and adoption of a clear-cut national mitigation strategy for the reduction of green house gas emissions is needed to facilitate a transition to a green economy. At no incremental cost, Nigeria can use the opportunity in resolving its energy crisis to address its climate change challenge and smoothly transit into green development pathway.

conclusion

Nigeria's ambition to meet the goals of Vision 2020 is in danger if the country fails to address issues of energy poverty and lacking infrastructural through a participatory governance approach. To make the Nigerian economy more energy efficient and green is well within reach, but any development has to start from the point of increasing the energy generation. Nigeria will have to embrace technologies that make the economy efficient.

Using clean energy in resolving the energy challenge will provide an added advantage in the greening process, therefore reinforcing the need to increase RE in the national energy mix. In the circumstances, the business as usual approach cannot work and change is imperative.

What will make this change happen? The People. The people have pressing needs to reduce poverty, to enhance their capacity to subsist despite the challenges and aspire to do all of that together, with a shared vision of their common future. The recent protests on fuel subsidy said that much. The people need political leadership that will share this vision or a leadership that inspires them to a similar vision. While Vision 2020 envisages achieving that, the great challenge remains winning the peoples' trust to share in the Vision. Government must therefore inspire and support the people to realize this vision: a fresh green deal vision that delivers good governance, respectable standards of living, and access to efficient clean energy services, good health care and sustainable socio-economic growth.

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Nigeria's Agriculture and Food Security Challenges

"Today's problems cannot be solved at the same level of consciousness that created them."
Albert Einstein

by Professor Chinedum Nwajiuba

Imagine… Kaduna, Abuja and Onitsha are mega cities like Lagos with populations over 12 million people. They are supplied with food made-in-Nigeria, some of it coming from urban agriculture on roof tops and gardens along rail- and waterways. A rail and road network that picks up food where it is produced and delivering it to consumers with a marginal loss of goods.

Imagine… Nigerian researchers breeding a cassava variety that grows in the most difficult of climates and gives double the yield, and breeding livestock that is immune to some of the new epidemics under extreme weather conditions. Imagine researchers and extension services supporting big and small farmers to decide what best to grow on their lands, even where extreme rains and droughts are degrading lands.

Imagine… small farmers growing more food throughout the year and making more money through processing of their products through drying, conserving, and juicing. Imagine subsistence farmers protecting their lands' fertility because they have long-term rights to farm their lands, armed with knowledge of organic and sustainable farming techniques.

Imagine… a new generation of Nigerian female and male farmers who choose what to grow next season after checking domestic and international market trends online, using appropriate technology and machinery even on medium sized farms.

introduction

Nigeria has the ambition of diversifying her economy from crude petroleum dependency. The country also faces a looming food security crisis with a growing population becoming increasingly dependent on imported foods. At the same time, the once dominant subsistence-oriented farm economy is at risk of gradual marginalization. Insecure land tenure, scarcity of funds and credit, labour scarcity despite overall high unemployment and stagnant technology have crippled its further development. Until today, a wide range of policies, programmes and projects have had limited impact in ameliorating these problems. Given the choice, young people from the rural areas rather try their luck in urban centres.

Climate change compounds the challenges confronting agriculture. The sector is dependent on the natural resource base and thus faces risks such as desertification, rising temperatures, changing rainfall patterns and sea level rise, leading to degrading agriculture and exacerbating conflict. So, what are the prospects of a Green Deal for agriculture in Nigeria?

vision for 2020

The development vision by Nigeria's government conceptualises a transformation in agriculture that would ensure food security, the right to sustainable development for all and adaptation to the climate change challenge. The government's transformation programme is meant to wean Nigeria off food imports by boosting domestic food production. This entails reforms in the input supply regime, a targeted region-specific increase in the output of priority commodities, post-harvest systems development, a strong orientation towards agri-business and promoting value-addition in the product chain. The success of the transformation depends to a large extent on reforming the fertiliser supply mechanism which is fraught with corruption. This programme is being strongly promoted by the current Minister of Agriculture who, however, has to contend with officials in his own ministry not entirely convinced by this vision, and states that do not yet show much buy-in. State-level involvement in the agricultural reforms is key because agriculture is on the concurrent legislative list and, in practice, is largely dealt with at the local and state level.

problem statement

A green deal for Nigerian agriculture has to confront the following key questions:

- Will Nigeria remain a largely agrarian country in terms of the share of agriculture in aggregate Gross Domestic Production, employment generation, and income for majority of the people?
- Can agriculture be a primary driver of Nigeria's future growth and provide an increased proportion of her foreign exchange earning?
- Can a green agricultural economy become an opportunity for ordinary Nigerians to benefit from development, reduce unemployment, alleviate poverty, and defuse conflict?

The declared aims of Nigeria's national agricultural policy are to "(i) attain food security, (ii) increase production and productivity, (iii) generate employment and income, and (iv) expand exports and reduce food imports thereby freeing resources for critical infrastructure development and delivery of social services." The current government seems to attribute the unsatisfactory state of Nigeria's agriculture to a

dominance of subsistence-orientation. The efforts of previous governments have been characterized as treating agriculture purely as a development issue. Today, we witness a shift in policy concept, philosophy and approach to a business and commercial orientation. The focus of the transformation programme launched in August 2011 is on the role of agribusiness. Specifically, the Agriculture Transformation Action Plan (ATAP) seeks to develop value chains for five key commodities, i.e. rice, cassava, sorghum, cacao and cotton. But fundamental questions arise:

- Can the transformation programme deliver sufficient production *and* inclusive development?
- Can it indeed ensure food security and eliminate hunger as articulated in the national policy on agriculture, the Vision 2020, and the Millennium Development Goals, especially MDG 1 on food security and poverty?

"In ten years, time I want my farming occupation to go international, be married with children. I rear Catfish and Tilapia, I will love to be exporting my farm products to countries both far and near."

C2DE, 20 – 25, Female, Lagos Semi Urban[1]

background

Nigeria faces huge food security challenges. About 70 percent of the population live on less than N 100 (US$ 0.70) per day, suffering hunger and poverty. Nigeria's claim to remain an agrarian economy hinges on two key facts. The first is the share of agriculture in the Gross Domestic Product (GDP) and the second is the proportion of the population engaged in the agricultural sector. On both scores, the agricultural sector contributes more than any other sector of the economy. Agriculture provides over 40% of GDP while the population of Nigeria involved in farming is between 60 and 70%. However, large regional differences exist. In the southeast, as few as 22% of the population live in rural areas, most of whom are engaged in non-farming activities[2].

Nigeria has about 79 million hectares of arable land, of which 32 million hectares are cultivated. Over 90% of agricultural production is rain-fed. Smallholders, mostly subsistence producers account for 80% of all farm holdings. Both crop and livestock production remain below potentials. Although the average agricultural growth rate was 7% between 2006 and 2008, this growth lies below the 10% necessary for attaining food security and poverty reduction. Among other factors, inadequate access to and low uptake of high quality seeds, low fertiliser use and generally inefficient production systems lead to shortfalls. As a result, Nigeria's food import bill has been on the rise. Nigeria's large, growing population has become dependent on imported food staples. This includes commonly consumed staples such as rice, wheat and fish. This was not the case prior to the boom in petroleum exports starting from the early 1970s.

Nigerian agriculture contributes to a small extent to global warming through bush burning and other environmentally adverse management practices, but it suffers the full impacts of climate change. All this is wholly consistent with the findings on the present and future state of agriculture in sub-Saharan Africa summarized in the excellent international assessment of agricultural knowledge, science and technology (IAASTD) concluded in 2008.

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1 *2020 - Young Nigeria's Perceptions*, research commissioned by hbs, May 2012

2 Akinsanmi, A. (2005). *Gender Relations and Food Security of Rural Families in Imo State, Southeast Nigeria.* Farming and Rural Systems Economics, Vol. 68. Margraf Verlag, Weikersheim, Germany; and: Nwajiuba, C. (2012). *Does agriculture have a future in southeast Nigeria?* Inaugural lecture, No. 5. Imo State University Owerri, Nigeria.

the challenges

Nigeria faces two central challenges to her agricultural sector and food security: population dynamics and climate change.

population dynamics

Nigeria's population

Population in 2011: 162 million people.
Population in 2050: between 230 and 430 million people.

Urban population in 2011: 51%, and growing.

Population earning less than US$ 2 per day in 2009 was 84%.

Nigeria in 2011: the world's 7th most populated country.
Nigeria in 2050: the world's 3rd most populated country after India, China, outstripping the USA.

A number of lessons emerge from the current and projected future population dynamics of Nigeria with major implications for agriculture and food security and, therefore, for the articulation of a Green Deal for Nigeria. These are:

- Nigeria's population is growing, and the country's food security challenges will grow with it. At the current growth rate of domestic food production, Nigeria is unable to feed its growing population. Domestic food production will have to expand at a faster rate.

- Nigeria's urban population will soon outstrip the rural population. The population shift to urban centres is projected to become even more pronounced in the future. Despite its roots, the urban population is disconnected from the food production system and will rely on the market for food supply. This supply will have to come from domestic production or imported food.

- Youth make up a growing share of the population. They are the bulk of urban migrants and are thus unavailable for agricultural vocations. This raises the challenge of retaining and educating the next generation of farmers. As agricultural technology development and diffusion has stagnated, the sector continues to rely on human labour for farm power. This stagnation is due to a lack of local innovation, especially in mechanisation that is appropriate to the ecology. Farmers cannot afford the equipment, and in turn there is a lack of local maintenance capacity. Mechanisation and labour saving devices are in urgent need and require the development of local capacity.

- Rural poverty will increase just as urban poverty has increased. Employment and income will have to be created for a large and growing youth population. With modern research and technology, agriculture provides a great opportunity to turn rural poverty and stagnation into development. At least in theory, the rural youth could produce the food that the urban youth consume. However, this would assume that the urban youth have the required purchasing power. But a different scenario may play out in which the rural youth do not benefit, where big agribusiness produces the bulk of food for the urban centres. Can there be agricultural jobs without consumers? Can there be high demand for agricultural products without jobs for

youth? Whatever way one looks at it, it is clear that agriculture as a development issue will remain a core challenge for Nigeria for the coming decades.

- To address these challenges, Nigeria's agricultural and food security policy and programmes should adopt a twin-track approach, on one side encouraging commercial agribusiness, while on the other side supporting the huge population of subsistence producers, as this is critical to rural food security, social cohesion and poverty alleviation.

> *"Instead of marrying a farmer I will pray to God to give me the right husband."*
>
> *ABC1, 20- 25, Female, Abuja Urban*

- The nature of these supports and encouragement should more than in the past consider the environmental challenges and remedy the consequences of past and present agricultural practices and management, which hinge on input support, and land resource utilization, management and conservation.

- The central role of women in the agricultural economy needs to finally be recognized and be reflected in the policies and measures that purport to buttress smallholders.

climate change and Nigeria's agriculture

Nigeria's climate is changing. The country's current and future climate challenges are summarized in the National Adaptation Strategy and Plan of Action on Climate Change (NASPA-CCN):

climate variables	mangrove zone	rain forest	tall grass (savanna)	short grass (sahel)
temperature	Up	up	up	up
rainfall amount	Up	up	down	down
rainfall variability	Up	up	up	up
extreme rainfall events: droughts	Likely	likely	up	up
extreme rainfall events: storms & floods	Up	up	likely	likely
sea level rise	Up	n/a	n/a	n/a

Evidence clearly shows that the weather is becoming more extreme, be that in form of drought or rain, leading to different impacts according to climate and geographical zones.

The Nigerian Meteorological Agency (NIMET) has assessed the Nigerian climate over the period from 1941 to 2000 and has demonstrated dramatic changes in weather patterns: Irregular rainfall pattern give rise to fewer rainy days[3]. NIMET demonstrated that the combination of late onset and early cessation of rains led to a shorter rainy season in most parts of the country from 1971 to 2000 compared to the period 1941 to 1970. Between 1941 and 2000, annual rainfall decreased by 2-8 mm across most of the country, with the exception of Port Harcourt where it increased by 2-4 mm. The rainfall trend between 1901 and 2005 shows a general decline.

[3] Adelekan, I.O. (2009). Vulnerability of Poor Urban Coastal Communities to Climate Change in Lagos, Nigeria. *Fifth Urban Research Symposium* 2009

Long-term records show that over the past 105 years, the amount of rainfall per year dropped by 81 mm. The trend of declining rainfall worsened after 1970 and continues to this date. This coincides with a period of sharp temperature increases. This general trend of a decrease in rainfall does not apply to the coastal areas, where places like Warri, Brass and Calabar have experienced a slight increase in rainfall recently[4].

Between 1941 and 2000, average temperatures increased by an alarming 1.4-1.9^{o} Celsius. It is exactly the kind of temperature increases that IPCC experts warn us would make parts of the world uninhabitable. Given the fact that scientists project a further temperature increase of between 2 and 5^{o} Celsius this century, one might wonder what kind of agriculture will still be possible in the areas most affected, i.e. in the extreme north-east, north-west and south-west of Nigeria[5].

Climatic changes already have varying, mostly adverse effects on agriculture and, therefore, food security in various parts of the country. Consequently the National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN), has identified a number of key measures with assigned roles to stakeholders at the national and sub-national levels. Higher temperatures result in decreased agricultural productivity and production, high evaporation rates and reduced soil moisture, lowering of the groundwater table and shrinking of surface water. Heat stress reduces human labour use on farms, lowers labour productivity and leads to rapid deterioration and wastage of farm produce.

Changes in the amount of rain, increased rainfall intensity and changes in rainfall patterns lead to decreased resource productivity and production (crops and livestock). Changing and erratic rainfall patterns make it difficult for farmers to plan their operations, may reduce the cropping season and can lead to low germination, reduced yield and crop failure. Erratic weather interferes with processing of produce (an example is sun-drying of crops and smoking of fish). Increased frequency of major storms causes damage to farm land, crops and livestock. Major storms can also cause road wash-outs, which make it difficult to access farms and to market products.

The NASPA adopted by the Ministry of Environment in November 2011 and awaiting approval by the Federal Executive Council, has two overall focuses with respect to agriculture and food security, which we endorse. These are:

Adopt improved agricultural systems for both crops and livestock

For example, diversify livestock and improve range management; increase access to drought resistant crops and livestock feeds; adopt better soil management practices; and provide early warning/meteorological forecasts and related information.

Implement strategies for improved resource management

For example, increase use of irrigation systems that use small amounts of water; increase rainwater and groundwater harvesting for use in agriculture; increase planting of native vegetation cover and promotion of re-greening efforts; and intensify crop and livestock production in place of slash-and-burn practices.

[4] Odjugo, P. A. (2010). General Overview of Climate Change Impacts in Nigeria. J Hum Ecol, 29(1): 47-55

[5] Also see technical background paper to NASPA, *Climate Change Adaptation Strategy Technical Report (CCASTR)* at www.nigeriaclimatechange.org

green agriculture and food security

Before Nigeria can address the underlying problems articulated above, there are three contending issues that need to be resolved. These directly determine the potential of a successful green transformation of Nigeria's agricultural economy and food security situation in a changing climate. These are:

1. The sensitivity and vulnerability of Nigeria's economy to the often unstable international crude oil market. The Nigerian economy is for over 80% dependent on the petroleum sector for the provision of public finance. Despite its significance to the national economy, the oil sector has not spurred real economic growth, has created very few jobs and its wealth has been distributed amongst a small elite. A national policy framework is needed to diversify Nigeria's economy away from a mono-product one, which is heavily dependent on petroleum mining and export (see the other chapters in this report). It is well accepted that the agricultural sector will be a key sector in this pursuit.

2. The second issue concerns the preferred pathway for agricultural development in Nigeria. The rural economy is heavily dependent on smallholder producers, whose primary need is household subsistence. They produce little marketable surplus. Since at least 1972, the target group of the National Accelerated Food Production Programme (NAFPP) has been this category of farmers. The aim was to help them raise output, productivity, income and thus break out of a cycle of poverty. Obviously, the failure of this approach has a significant social impact. The contemporary policy thrust focuses on a transformation of the agricultural sector which seeks to promote agribusiness along the value chain.

3. The third issue is whether a green agricultural sector can assure food security for a growing population of Nigerians. The current controversies around different interpretations of what constitutes a green economy provides an opportunity for refocusing the policy thrust and refine strategies for an agricultural sector that is predominantly low carbon, resource efficient and socially inclusive. This will include more sustainable agricultural practices that protect the soil and use fewer external inputs (especially agro-chemicals, such as mineral fertiliser, pesticides and herbicides),

Understanding this we can proceed and address the underlying problems that a green deal for Nigeria's agriculture and food security needs to contend with.

Nigeria remaining a largely agrarian country

The lesson from developed economies and the experience of other countries is that, even where aggregate volume and value of production increases, the share of agriculture in GDP declines over time. Nigeria's goal should still be to raise aggregate output and value of production through value addition along the production / supply chain. A similar trend can be observed in agricultural employment. A picture emerges in which less labour is engaged in the agricultural sector, yet output increases. This is generally attributed to the higher economic returns on labour in other sectors of the economy. In Nigeria's case, the drop in the number of people engaged in agriculture has not come about through a process of structural economic transformation of the sector but by an abandonment of rural farm life for urban areas. In contrast, the transformation towards a higher-yielding, more intensive agriculture in developed countries has often emerged from technological development, especially mechanisation which raises total factor

productivity, specifically land, labour and capital productivity.

When projected into the future, Nigeria's young and growing population is increasingly living in urban areas and alienated from rural life and the farming vocation. With stagnant technology and virtually no advance in mechanisation, maintaining agricultural production will be difficult. This shows the urgent need for two national policy interventions. The first is developing local technology, especially mechanisation capacity. The second is developing a successor generation of farmers. Adequate incentives and subsidies are needed to achieve this.

agriculture as the prime driver of Nigeria's future development

Prior to the present era of dependence on crude petroleum exports as the source of Nigeria's public finance and foreign exchange, the agricultural sector was the prime driver of the economy and main source of foreign exchange. But for decades now the expenditures of the significant funds accruing to the public purse tend to favour the urban non-agricultural sectors. They have drawn labour and investment away from agriculture. There is little reason to expect this to change, but there are lessons to be learnt here.

The agricultural sector needs sustainable growth in output / production, with less carbon emissions. Contrary to common beliefs, according to the IITA and government statistics, cassava and maize yields per hectare have risen. The rate of increase has, however, not kept up with the increase in consumption. Growth also needs to be socially inclusive, with the benefits equitably distributed so as to reduce rural poverty and eliminate hunger and reduce food insecurity. The current policy emphasis is to increase the domestic production of basic staples. It would be commendable if Nigeria were to achieve this in the short or even medium term. But there is little basis for optimism that agriculture could once again become the prime driver of the Nigerian economy and an important provider of foreign exchange.

A supplementary policy tailored for high-value commodities, such as horticultural products, and developing a high-value (international) market for organic products could be initiated. A few state governments in Nigeria, such as Kwara State, appear to be working in this direction. The challenge here will be ensuring the social inclusiveness of the development and the distribution of the accruing benefits.

a green agricultural economy as an opportunity for ordinary Nigerians

While the current policy is designed for the commercial agribusiness sector to quickly produce surpluses for domestic consumption and reduce import dependency and foreign exchange expenditure, there is still a huge rural population that will require agricultural policy support with a development focus. In designing this policy, consideration should be given to the twin challenges of rising population in both rural and urban Nigeria and climate change.

Consequently, there is need for further policy reform on inputs supply, technology improvements, credits and subsidies. The recently launched transformation programme seeks to supports improved seeds and seedlings in particular. These cannot be diverted from agricultural use into non-farm uses. So far the government has not promoted or distributed genetically modified seeds, which are opposed by many Nigerians including major NGOs. The main reason for this opposition is concern for health and ecology. Other reasons are the limited ability to pay, coupled with the risks associated with reliance on the market for supplies. There is also suspicion of the existence of terminator genes in GM crops. Were Nigeria to allow GM crops this would potentially harm its ability to export food to Europe. The National Agricultural Seeds Council (NASC) is the major government agency responsible in this area.

It is hard to see how without more development benefits reaching the rural poor, the trend of growing migration of people and livestock from the drier, hotter parts of the country can be stopped, with the attendant resource competition and social and security conflicts. It is being argued that the current social conflicts in the Northeast have a link to the severe temperature increases, and reduced precipitation. As discussed in the chapter on climate change and security this has reduced Lake Chad and led to the loss of livelihood for fishing and farming communities in that region.

A rapidly growing poor urban population may not be in a position to constitute effective demand for either locally produced or imported food. The large urban food-insecure and poor population could thus present future security challenges to Nigeria, as in other sub-Saharan countries.

challenges to a green deal for agriculture and food security

There a number of challenges to the attainment of a vibrant agricultural economy that sees an equitable distribution of the benefits of sustainable development and reduced carbon emissions. These can be articulated as follows:

- What is the potential of low external input and organic agriculture to feed Nigeria's large, growing population?
- Can resource use efficiency be increased significantly without further adverse environmental consequences (soil, water, etc.)?
- What are the critical low carbon issues in Nigeria’s agriculture?
- How is gender inclusion central to alleviating poverty and improving food security?

The adaptation measures currently used by smallholders in the agricultural sector provide some insight. Traditionally, the response to resource problems by crop farmers and livestock herders is the seeking of new lands. This is a process that only functions where land use systems are extensive, allowing for migration of people and livestock. At present, farmers are not simply searching for new land and water sources, they also seek new external inputs such as drought-resistant bio-tech seeds and inorganic fertilisers to raise output per hectare as soil fertility declines and the limits of the traditional fallow measures are exceeded. In addition, farmers and herders seek non-agricultural livelihood means.

The green deal for agriculture and food security in Nigeria needs to embrace the complexity and heterogeneity of the sector both in ecology and socio-economy. But it is uncertain if the recommended adaptation measures in the NASPA will be adopted across government. This is due in part to the absence of information and large funding needs for adaptation at the national, state and local levels. In addition, at present there is no holistic governance of climate change matters in Nigeria. A national Climate Change Commission is expected to synergise policies and bring stakeholders from across the narrow confines of specific ministries, departments and agencies together.

The high population density seen in several regions makes maintaining or restoring soil fertility crucially dependent on the sourcing of external inputs by smallholders, who are the dominant producers. This is especially true for organic and inorganic fertiliser. While the emerging agribusiness sector uses more external inputs, the extent of that use is still considered low by international standards. The current policy preference is, therefore, to promote the use of external inputs – inorganic fertiliser, bio-tech seeds, etc. This is, however, done in the absence of a true cost and sustainability analysis. In some areas Nigeria lacks adequate research findings on its policy options. Specifically, there is not enough comparative information on the cost and benefits, including the sustainability, of high-input versus organic farming in Nigeria.

Many agriculturalists worry that a transition to low external input organic farming may raise the cost of food. The experience in some more advanced economies with this is mixed. Furthermore, the potential of low external input and organic agriculture to feed Nigeria's large, growing population remains unclear. The goal of a 'sustainable agriculture' transformation requires that resource use efficiency be significantly increased without adverse social and environmental consequences. To make soil and water utilisation sustainable, the current generation of farmers will need to be weaned off of generations-old practices. This suggests that improved farm management practices are better introduced after educating future generations of farmers.

In this context it is noted that Nigerian farmers make a marginal contribution to global warming through such practices as deforestation and bush burning. This can be addressed through the extension services that advise on alternative land preparation and weed control measures. Nigerian farmers believe that without bush burning there will be more weed infestations that require more labour to handle. Ironically, labour scarcity on farms is prevalent and seems to be on the rise. In most Nigerian farming systems both women and men provide farm labour, but there is gender stereotyping of roles. Weeding and post-harvest handling are commonly the role of women. This is important as this is where harvest losses accrue. Policy and programme interventions, therefore, have to factor in gender roles in ensuring food security.

recommendations

A number of issues need to be considered in conceptualizing a green deal for Nigerian agriculture. This would be greatly aided by a comprehensive mapping of agricultural potentials, taking into account the factors listed below.

i. The fact that the agricultural sector is highly impacted by the changing climate should be at the fore in conceptualizing and further developing a green economy vision for Nigeria.

ii. Resources that where once taken for granted - water, land, minerals, fossil fuels – already face or will soon have limited availability and high cost. Water, for example, is increasingly scarce for Nigeria’s agriculture not just from the changing rainfall patterns but also from drying aquifers, rivers and rivulets.

iii. There is a need to reassesses the environmental footprint of agriculture and its greenhouse gas emissions, water use and soil management. Despite the existing regulations, land preparation and use practices entail deforestation and bush burning, which contribute to GHG emissions. Currently, no comprehensive annual assessment is made of the sources and volume of these greenhouse gas emissions.

iv. Appropriate technology can not only increase productivity and improve efficiency but also reduce GHG emissions. Thus the magnifying effect of green development impacts positively on agricultural output and on the environment. Specifically, technological and management innovations are recommended that reduce GHG emissions and land degradation, such as stopping bush burning, utilisation of waste from livestock farms in biogas silos and reducing post-harvest losses (also through local fruit processing) as these also add to GHG emissions.

v. Farmers can be encouraged to identify and focus on increasing the production of high-value and organic agricultural products. Notwithstanding the fact that the organic foods sub-sector is a niche market aimed primarily at wealthy urbanites, it can boost farmers’ earnings and potentially bring in foreign exchange.

vi. Policy measures should be designed to reduce carbon footprints, encourage waste conversion, use energy-efficient means of production and employ renewable energy from wind farms, solar, small-scale hydro and biomass. In addition, a reduction in non-biodegradable waste and storage materials can be achieved.

Achieving the green deal for agriculture and food security in Nigeria requires a two track approach, on the one hand fostering a future for agri-business to increase food security for a growing urban population and on the other hand offering continued support to smallholder and subsistence farmers with the aim of alleviating poverty. Both tracks need incentives and subsidies to boost domestic production.

Nigeria needs a special programme devoted to a new generation of farmers. The programme should provide young educated people interested in agriculture with training in agricultural entrepreneurship. It should also provide some financial and technological support. This new generation of farm entrepreneurs will thus be enabled to use improved technologies and modern management approaches that help ensure farm profitability and sustainable resource use. Profitable agribusiness is important to keep an emerging faming entrepreneurial group engaged and stop a re-creation of current challenges with farm sector desertion by young Nigerians.

The government needs to guarantee land tenure security and land access in the face of changing population dynamics, migration, and potential competition between agri-business and smallholder and subsistence producers. This will also require adequate investments and funding incentives. Access to farm land is being restricted for cultural reasons, by the existence of communal holdings with unclear use rights, as well as misappropriation and large-scale acquisitions. Urbanisation has led to large-scale acquisitions of land by the government. This land has often been allocated to a small elite that have limited access to this land.

There is a need for the identification of agro-technologies for improved soil management that reduce carbon emissions while increasing production. Considering that Nigeria’s agricultural sector is mostly rain-fed, increased investment and extension for irrigation facilities, including water harvesting and precision drip systems may be an option for some farmers, the latter especially for market-oriented, often younger and educated, farmers.

To implement a green deal for Nigeria's agriculture, a tighter regulatory environment may be required aimed at reducing GHG emissions. For now, consistent enforcement of existing regulations on land use and management, including bush burning and land degrading practices is needed.

It would generally be helpful to encourage a reduction in chemical use in crop and livestock production, including fishing. This would have immediate positive health effects, but could also result in an increase in farm employment. These jobs would help improve food security, reduce poverty and lead to a better distribution of the benefits of green development in the agricultural sector. Sustainable management and maintenance of soil fertility and the wider ecological diversity is crucial to the future of farming. Bush burning can be stopped by raising public awareness, moral and community-driven persuasion and consistent enforcement of the existing regulations. In addition, the next generation of farmers can be discouraged from such practices during their training.

The conventional approach to growth as substitutive of environmental health and sustainability has been shown to be false. Strong economic performance is not necessarily exclusive of great environmental performance. Through innovation Nigeria can solve the current challenges and her agriculture could aim to become carbon-neutral by 2030. Improved farm management that is conscious of soil fertility requirements, integrated soil and pest management that put an end to soil-degrading practices and integrated crop and

livestock systems that operate as close loops linking waste, by-products and inputs are examples of such innovation. Material-flow analysis and application of such lessons should become mandatory in the education of a new generation of Nigerian farmers.

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climate change and conflict – a green economy to promote human security

"If any free society cannot help the many because they are poor, they cannot save the few who are rich."
J.F. Kennedy

by Huzi I. Mshelia

Imagine… a country where oil is no longer the main source of wealth-for-a-few, but where young people can access economic growth in different sectors such as renewable energy, agriculture, manufacturing and transport. Marrying a farmer is fashionable as it provides security for a small family.

Imagine… the female cassava farmer from Osun State who suffered total loss from flooding during 4 consecutive years before she was re-trained for onshore fish farming by her farming cooperative, thus saving her from moving to Lagos to look for a job as a cleaner. She employs six staff on her fish farm and is selling fresh fish to the local market, frozen fish to a Lagos fish market and fish bone powder to a pharmaceutical company. Her farming cooperative has obtained a water licence from Ogun State government, allowing them to drill one borehole and extract a limited amount of cubic metres of water each day, which is tightly controlled. The farmer recycles water at home and on the fish farm and stores rain water in special tanks; she sells any redundant water to her colleagues who remained in cassava farming.

Imagine… the male student from Jigawa State whose father told him never to go into farming after his village and entire land was swallowed by sand dunes. He is studying in Jos at the Renewable Energy Institute, one of several institutes for cutting edge Applied Sustainable Technology created under the Sovereign Wealth Fund in 2012. The student is developing an integrated concept for an irrigation system (one borehole with pump for three hectares of land) combined with measures for re-greening of peripheries of land to stem sand encroachment.

Imagine… Lagos and Ibadan merging into one megacity with more than 25 million inhabitants, with all power stations moved to Ibadan to protect them against sea surges. All local governments demarcating emergency rescue points on high land, where communities congregate during floods. Transit camps along the megacity's periphery for people arriving from across the Delta, having lost their livelihoods to the ocean, awaiting initial aid in food and shelter and the allocation of a small parcel of land by the Federal Ministry for Rehabilitation and Resettlement.

introduction

If you think climate change is a problem, there is a much bigger problem…conflict. All around Nigeria we witness the ongoing unsustainable management of natural resources. Scarcity has led to a scramble for water, minerals and other such resources, and indeed to conflict. At the same time, Nigeria is particularly vulnerable to the impacts of climate change and this affects the country's natural resource base. It creates more scarcity, intensifies competition and, ultimately, leads to more conflict. Climate change acts as a "threat multiplier", exacerbating existing stresses and creating volatile situations. While there is a global consensus on this multiplier effect, the security implications of climate change are not yet well understood. They may well be much greater than people think.

The costs of adaptation to the impacts of climate change are very large and will have a negative impact on economic development. The cost of inaction will be even greater. For Nigeria, a study commissioned in 2009 by the UK Department for International Development (DFID) in 2009 estimated that in the absence of adaptation measures, between 2 and 11% of Nigeria's GDP could be lost by 2020. It is clear that conventional approaches of adaptation to climate change may not be enough to overcome the problem.

problem statement

The effects of climate change are manifesting themselves more and more often. The world is witnessing rising temperatures, more severe droughts as well as extreme weather events like floods and hurricanes. In Nigeria, climate change impacts have ravaged most of the northern states, gradually turning the entire region into an arid zone or desert. The southern part of the country has to deal with severe coastal and soil erosion. This has undermined the economic asset base, destroying human settlements and livelihoods.

These environmental changes are compounded by a deterioration of security especially in the north of Nigeria where civil and religious unrest is manifesting itself and has assumed a deadly dimension through serial bombings. While the situation remains to be fully explained, the conflict is most likely fueled by widespread poverty, high unemployment, hunger and general social discontent. At the same time, in parts of the south we witness communal clashes over farming land and a struggle for control over depleting natural resources.

We have to ask ourselves, has the intense exploitation of natural resources or the scarcity of these resources led to or exacerbated these conflicts? Is there a strong nexus between the unfolding impacts of climate change and the present wave of conflicts around the country? What are the consequences of these conflicts for national and regional security? Can the adoption of a green economy vision and providing access to green energy for all (amongst other recommendations contained in this report) improve the security situation in the country?

background

The generally accepted scientific view is that climate change per se does not cause conflict, but its effects on fragile ecosystems and societies that are already under pressure from a lack of economic opportunities will combine to exacerbate existing threats and insecurities. Increasing

unemployment, widespread poverty, a growing population and an over-dependence on natural resources that are sensitive to climatic changes, all in the absence of a robust sustainable development strategy, make Nigeria highly vulnerable to resource conflicts that are exacerbated by climate change.

The intense exploitation of natural resources (most of it unsustainable) has increased economic inequality and resulted in abject poverty in the midst of plenty. In the absence of a compelling unifying socially inclusive vision for the whole country this inequality has nourished discontent and increased vulnerability to conflict. Internal migration has become a national security concern. Though the number of people that are currently internally displaced cannot be confirmed, it is clear that internal migration as a result of resource scarcity, climate change effects and unemployment will increase.

Poor governance and weak disaster management, partly as a result of inadequate information on the extent of climate change impacts, can in themselves heighten conflict. Ultimately, the ability of the government and communities to address and adapt to these changes depends on their knowledge and understanding of the complexities involved, the nature of responses envisaged and the inclusion of the most vulnerable in the decision-making. These complexities require new approaches that make sense of the unique impacts of climate change on communities and livelihoods and sophisticated tools for policy-makers and institutions to respond to conflicts. This requires that those most vulnerable, who will potentially be deprived of the benefits of natural resources, are factored into any human security framework developed by the government. The human security framework must consider all threats, deprivation and exclusion, and vulnerability.

By crafting a vision with which all can identify and which promotes national cohesion and reduces tensions, the current security situation might ultimately serve to unify Nigerians. To reduce the potential for conflict, the government has to foster an atmosphere of social justice and equity. The poor and those less privileged should not simply be “consulted” on the management of natural resources but be empowered to actively participate in decision-making processes. Thus the governance of natural resources can be made more transparent and accountable.

In light of the current problems, the government should utilise existing platforms at the national and regional level to mobilize resources and further develop institutional capacity to implement a national agenda that integrates climate-related security concerns into the strategic and policy framework.

overview: the climate - conflict nexus

The Central Bank of Nigeria (CBN) estimates that Nigerian agriculture, which is mostly rain-fed, accounts for 42% of GDP and employs about 60% of the workforce. The 2007 Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) estimated that 25% of Africa’s population already experience high levels of water stress and that by 2050, up to 600 million Africans will be at risk. Nigeria's agricultural sector, and most of the hydro-power it depends on, is reliant on rain and this makes not just this sector but the entire economy highly sensitive to the vagaries of climate change.

Recently, the linkages between climate change and security have become a matter of public discourse. Most discussions have centered on how to effectively harness natural resources management, including renewable energy, to promote security and the need to increase energy access to reduce conflicts. The government's economic blueprint, the Vision 20:2020, aptly recognises this: *"Over the next decade, climate change is expected to assume greater significance and influence over the actions of the international community and between the key actors in the global landscape. The potential for climate change to bring about damaging and irrecoverable effects on infrastructure, food production and water supplies, in addition to precipitating natural resource conflicts makes it a critical challenge that must be effectively responded to by any economy seeking sustainable growth in the years leading up to 2020."*

> *"My view about life in Nigeria; it's not too easy; it's not that easy because in Nigeria now we're facing so many difficulties, so many problems: insecurity, unemployment, bad roads, water. You know, Nigerians are suffering and all this insecurity is also caused by all the little things we don't have in our country; unemployment, no good roads or water. Assuming at these things are available in Nigeria, I don't think somebody who is reasonable will stand up to say let me carry gun or carry bomb to go and kill myself or kill somebody else so our country is very, very difficult and we need to do something about it."*
>
> *ABC1, 20 – 25, Female, Abuja Urban*[1]

The US Department of Defense's Quadrennial Defense Review (QDR) has listed climate change as a critical threat to national security stating that it "*could have significant geopolitical impacts around the world, contributing to poverty, environmental degradations and further weakening of fragile governments.*" The QDR further warned that food and water scarcity, and mass migration out of affected areas, will increase the *"burden to respond on civilian institutions and militaries around the world."* Other security agencies around the world have echoed these concerns. A UK Ministry of Defense green paper predicts that the effects of climate change will increase international instability and pose threats to British interests globally. The UN Secretary General has singled out climate change as one of the sources of the conflict in the Darfur region and warned that more conflict will follow. The IPCC's Special Report on Extreme Weather Events notes that climate change can *"fuel violence and conflicts within and between states."*

Despite these more general observations, there is a lack of consensus on the precise nexus between environmental factors, climate–related risks and civil or international conflicts, with sharp disagreements between those who find relationships between the issues and others finding only a weak nexus or none at all. Notwithstanding this debate, there is a scientific consensus that Africa and Nigeria will very likely face severe climate change impacts. The impacts will be aggravated by low adaptive capacity if a population is highly dependent on natural resources that are sensitive to climate changes. Climate-related risks have been shown to exacerbate existing stresses and thus fuel conflict. Poverty, shortage of food, drought, unemployment, energy poverty and inadequate health services are current challenges faced daily by a majority of the Nigerian population. The effects of climate change, if not properly managed, could therefore be expected to lead to deaths in those areas of high physical vulnerability or have a dense population that has low community resilience and weak governance structure.

In the author's view, inefficient management of natural resources and widespread corruption have

[1] hbs research into young Nigerians' perceptions of their country, May 2012

contributed to the ongoing militancy in the Niger Delta. The agitation for equitable distribution of dwindling resources has now become linked to a new wave of violence perpetrated in parts of the north. If this is proven to be correct, Nigeria is set for more violent conflicts over resources in the years to come. This reality and the lack of a truly unifying national vision have made it difficult for the majority of the population to identify with government programs. This lack of trust is exemplified by the rising level of protest.

climate impacts and the implications for human security

The IPCC Fourth Assessment Report 2007 identified Nigeria as a climate change "hot spot" likely to see major shifts in weather patterns in the 21st century. The country's northern arid zone is already facing excessive heat and less than 10 inches of rainfall in a year. This is 25% less than that observed 30 years ago. The projected temperature rise to more than 40^0 C would further increase variability in rainfall. It would lead to flooding in the south, while decreased precipitation would result in droughts in the north. Extreme weather events have become more frequent in recent years, with major floods in 2011 in Ibadan, Lagos, Sokoto and Kano. Scores of lives were lost. Perversely these floods are often accompanied by droughts.

Variability in rainfall will also affect river flow patterns, negatively affecting irrigation and hydro - power potential. Socio-economic activities have already been negatively impacted in the Lake Chad basin and along the Niger river. The loss of livelihoods in the fisheries and ancillary industries has created a tremendous sense of hopelessness. Today, people previously engaged in fishing are jobless and forced to migrate in search of new opportunities. The resulting migration mainly to urban areas increases the stress in cities already saturated with unemployed youths. These youths might well become the willing tools of radical groups, perpetrating violence or other vices[2].

According to a National Population Commission report, 56 million Nigerians reside in the urban areas while 87 million live in rural areas. This population puts tremendous pressure on the ecosystems, thereby making it even more vulnerable to environmental changes. Logging, mining and hunting continue unabated. These stresses create competition over limited resources and the risk of conflict rises.

The 2003 First Nigerian National Communication to the UNFCCC estimates that the nation's southern coastline is susceptible to sea level rise between 0.5 and 1.0 meter by the end of the century. Were the sea level to rise up to one meter, between 45 and 50 million people will need to be relocated. As the coastal region is home to most of Nigeria's industry, this makes the economy even more vulnerable to the impact of climate change, with all its attendant socio-economic

[2] Picture: Landscape in Yobe State, by Yahaya Ahmed, DARE (Development Association for Renewable Energy) Kadun a

consequences.

The 2011 Climate Change Vulnerability Index published by the UK-based risk company Maplecroft, classified Nigeria as being at “high risk”. As noted above, a 2009 DFID study estimated that, if no adaptation measures were taken, between 2-11% of Nigeria’s GDP could be lost by 2020. This analysis was predicated in part on the assumption that, with sea level rise, onshore oil fields could become submerged. This would result in higher production costs, reduced investment and deference or outright loss of production.

The state of the nation's water resources is critical, with the UN Food and Agriculture Organization (FAO) rating water use and conservation practices as “poor” by both international and African standards. Only about 8% of homes have access to treated pipe-borne water. Climate change will exacerbate water shortages as rising temperatures and decreasing rainfall will worsen the droughts experienced in much of northern Nigeria. Southern Nigeria's coastal areas are dealing with a contamination of freshwater due to increased flooding caused by sea level rise. This results in high salinity including from pollution of sediment and sewage. Due to the projected population growth, water stress and scarcity will need to be given high priority by the government if Nigeria is to avoid a scramble over these limited sources.

Another critical risk to national development is land use and the availability of productive land. Desertification has affected most of northern Nigeria and the federal government has officially declared the 11 northern states most affected as “frontline states”. The 2002 *National Action Programme to Combat Desertification and Mitigate the Effects of Drought* notes, “between 50% and 75% of Bauchi, Borno, Gombe, Jigawa, Kano, Kebbi, Kaduna, Sokoto, Yobe, Adamawa and Zamfara states in Nigeria are being affected by desertification. These states, with a population of about 29 million people, account for about 43% of the country’s total land area. In these areas, population pressure resulting in over grazing and over exploitation of marginal lands has aggravated desertification and drought. Entire villages and major access roads have been buried under sand dunes in the extreme northern parts of Katsina, Sokoto, Jigawa, Borno and Yobe States.” The southern and Niger Delta region are low-lying and have experienced decades of unsustainable land use. This densely populated area with vulnerable economic assets presents a real development challenge, which is amplified by climate change impacts. Sea level rise of 1.5-foot would submerge more than 11,000 square meters of coastal land.

Official statistics are lacking on the number of internally displaced persons (IDPs) in Nigeria. A US State Department report on Nigeria estimated that conflict displaced 3 million people between 1999 and 2006, with at least 80,000 homeless at the end of 2009. This number has surely been greatly increased since then.

All these projections demonstrate the high degree of vulnerability of Nigeria. Climate change presents a serious threat to sustainable development and certainly impedes its efforts to reduce pervasive poverty, create jobs, enhance access to sustainable energy and improve the well-being of its citizens. The impacts described are capable of further undermining the ability of government and society to respond adequately to disasters, leading to lower economic opportunities and thereby heightening the risk of conflicts that ultimately threaten national security.

complexity of the problem and challenges

It is difficult to categorically state the full extent of the security implications of climate change on a nation. It is, however, no longer debatable that scores of conflicts, some of them violent, have occurred over limited resources. Nigeria has had its fair share of conflicts over resources: the continual clash over grazing routes between farmers and herders; communal conflicts over productive farmlands and agitation over the control of oil resources. In the absence of empirical studies it is, however, difficult to directly attribute such events to climate change. Nevertheless, climate impacts have exacerbated some of those conflicts, thereby increasing the risks.

Climate change has introduced new risks not hitherto envisaged in either policy or existing governance structure. The socio-political challenges posed by climate change are capable of weakening states and communities. Containing such risks will severely stress the government's ability to coordinate and organize an effective response. Poor government responses are capable of creating a perception of injustice by those whose expectations for remedial actions are not met. This will heighten tension and instability, resulting in unrest, violence, criminality and other forms of insurgency. The credibility of government will be called into question, eroding respect for the political leadership and creating a negative relationship between the government and the people. In Nigeria, there already is a deep-rooted perception that the government is corrupt and unaccountable. This has led to agitation against government officials and institutions that lack in trust or public accountability.

The weak responses by the government could be attributed to an inadequate assessment and general lack of understanding of the linkages between climate change and security. Increasing the knowledge base and governance options of government institutions - and the security services in particular - on the security dimension of climate change is imperative.

The human realms of water, food, energy, health, financial and environmental security are interlinked and the failure of one affects the others. The absence of a social safety net against financial difficulty or health problems, for example, could negatively affect access to energy and slow down the attainment of social security. To guarantee the security of every citizen will entail the full development of the human capital potential of the country, which for Nigeria must be leveraged as a matter of economic priority. Currently, 60% of the nation's population is between the age of 15 and 30 years and although reliable figures are not available, it is safe to say that a great percentage of them are unemployed. Some studies have shown that alienated young people who lack resources and economic opportunity are most likely to join rebellion. Jobless youths could deepen the recruitment pool for political violence, as exemplified by the April 2011 post-election violence in Kano and Kaduna. It could also explain some of the Boko Haram phenomenon in Borno and other northern states.

The academic discussion on climate change and security is currently of limited practical use to policy

makers. The reasons for this include the lack of full analysis and assessment of climate-related disasters and their implications, a lack of reliable data, the narrow focus on conflict as the only security outcome of interest, and insufficient attention being paid to variations in vulnerability at the local level. The discourse on climate security must integrate governance of the economy with policy makers' need to prioritize among managing limited resources affected by climate change, strengthening governance, building resilience for the fragile economic base for the poor, diversi fying means of livelihood, and initiating a new economic regime that factors in peoples' aspirations to raise their standard of living, and optimizing the demographic dividends.

In proffering solutions, the government must exhibit exceptional political wi ll by factoring the challenges of climate change, thus far absent in its response, into the insurrection in the Delta, disaffection in the North, and ethnic violence in the Middle Belt. For any solution that addresses these complexities to be viable, it must sustainably mobilise resources that can support the implementation of plans and strategies. Such plans and strategies must ensure social inclusion by making the most vulnerable and those who are socially excluded part of decision making. They must also reflect gender considerations to balance between men and women and include self-evaluation and monitoring mechanisms.

The nexus between the availability of energy, human development and human security has been well established and should be factored into decision-making. A 2002 UNDP analysis shows significant improvement in the Human Development Index of Ghana, Senegal, China, Malaysia and Chile following improvements in the provision of energy services. It, therefore, follows that where energy access is created the human security elements of water, health and agriculture would be enhanced and sustained.

the unknown factors

As observed earlier, the full implications of climate change for security cannot be assessed with a high degree of certainty, just as the scale and magnitude of the impacts cannot be predicted with certainty even with the best available knowledge. The IPCC Special Report on *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (SREX) does, however, pro vide some projections on the extent of climate-related disasters that are likely to occur and the nature and level of risk management that will be required. Since there are no verifiable data available on the quantum of damage, the amount of financial resources that will be needed are unknown.

Similarly, the nature of the responses from tribal and community leaders in the face of unfolding climate impacts is unknown, particularly when it comes to their relationship with the most vulnerable who are already experiencing injustice through the maldistribution and poor allocation of natural resources and from lost economic opportunities. For example, in a rare display of distrust, during the post-election violence in parts of northern Nigeria, some traditional rulers were physically attacked and their properties vandalised by irate youths who felt these leaders had conspired with the political system to perpetuate inequality and corruption. The northern traditional institutions are suddenly faced with a credibility problem and are viewed with skepticism. The situation has potentially jeopardised the strong traditional conflict mediation and reconciliation mechanisms that were once deployed to effectively settle conflicts. The future role of such traditional mechan isms in resolving climate-related conflicts has, therefore, become uncertain.

Another risk that may reduce policy options is the inconsistency of government. Successive governments have paid little attention to continuity of policies, preferring to jettison existing policies and initiating new ones, even if the change is just in name.

conflict trends and dynamics

Against the background of current and projected climate impacts, the following trends may emerge:

migration

Under a business-as-usual scenario and using available data on population growth and other socio-economic indices, Nigeria is likely to experience high migration occasioned by desertification in the north and coastal and soil erosion in the south. The intensity and frequency of the climate-induced desertification in the north and coastal erosion in the south will continue to affect the production capacities of the densely populated farming and fishing communities respectively, resulting in increased migration. Such migration is likely to be local, within the affected states, as well as regional. All across the West African sub-region, these movements will generate significant social and economic impacts that are largely uncontrolled.

Host communities that are unable to cope with the pressure will either resort to self-help in dealing with the situation or seek humanitarian assistance. The cities of Lagos, Kano, Kaduna, Port Harcourt and Ibadan are typical examples of rural-urban migration leading to overpopulation, unemployment, scarcity of social amenities resulting in the inability of the political system to adequately respond to disasters, as witnessed during the floods in Lagos, Ibadan and Kano in July and August 2011. These cities have also witnessed sprawling unplanned slums that are providing base for local gangsters, ethnic and religious militias and other criminal groups creating security concerns and potential conflict hotspots.

unemployment

Given the country's large numbers of unemployed, the majority of which are youths, the next decade will be volatile when one considers the experiences with youth restiveness, both in the Niger Delta and youths' willingness to become involved with extreme violence in the northeast. Three key findings of a 2010 British Council study on demography are:

i. *If Nigeria fails to collect its demographic dividend, the seriousness of the country's predicament should not be underestimated. Its prospect will be bleak and could be catastrophic.*
ii. *In the worse case, Nigeria will see: growing numbers of restless young people frustrated by lack of opportunity; increased competition for jobs, land, natural resources and political patronage; cities that are increasingly unable to cope with the pressures placed on them; ethnic and religious conflict and radicalization; and a political system discredited by its failure to improve lives*.
iii. *Demography is pushing Nigerian states and regions into widely different economic trajectories and could further increase in equality if measures are not taken to promote social cohesion*[3].

[3] *Nigeria – The Next Generation*, http://www.britishcouncil.org/next_generation_nigeria_report.pdf

shrinking resources

Dwindling natural resources, like soil and water that are subject to the impacts of climate change would become less accessible and more scarce with a growing population. This point was aptly made in the United States House of Representative's Committee on Energy's Report which notes in part that the *"the densely-populated and oil rich Niger Delta is already the scene of conflicts over the sharing of oil revenues. Land loss and increased risk of storms will exacerbate these tensions as well as the challenge of maintaining the existing oil infrastructure."*

The nation's over-dependence on oil resources has for a long time preoccupied the minds of policy makers. Unless the government demonstrates more transparency in the management of oil resources, diversifies the economy and reduces its dependence on the petroleum resource, the conflict situation will likely persist. The mass protest over the withdrawal of the petrol subsidy in early 2012 demonstrated peoples' increasing resolve to demand accountability of how the nation's resources are being exploited.

The inability of most state governments in the north to look beyond the monthly oil subvention as the only source of income has limited the opportunities of many youths to be engaged in other sectors, like agriculture. Conflicts and insecurity in the north would have been greatly reduced had the states invested in irrigation and small-scale entrepreneurship schemes that have the potential to provide livelihoods.

The Lake Chad basin

Lake Chad once was one of the largest lakes in Africa. Over the past 30 years it has shrunk by about 97%. Over 25 million people from four countries - Nigeria, Chad, Cameron and Niger - depend on the lake for drinking water, irrigation and fishing. The Nigerian side of the lake has now almost completely dried up and Nigerian fishermen have to cross to the Chadian side for fishing. Most of the time they are chased backed or arrested and their boats and catches confiscated. Here resource scarcity has developed into a potential security problem. Most of the youths formerly engaged in economic activities around the lake have had to migrate to major cities like Maiduguri, seeking jobs that are hardly available. It is not unlikely that some of those youths have, out of frustration, become willing recruits for radical groups like Boko Haram, who might perceive their fight seeking social justice from an inept political leadership.

Other scenarios predict "water wars". The Lake Chad basin, bordering Nigeria's northeastern state of Borno – once one of the largest lakes in the world – has become a potential hotspot of conflicts owing to its near depletion. Increasing demand for water resources and unequal access to the lake have created a constant sources of tension over scarce resources. Such water capture would undermine existing water-sharing agreements and create new conflict situations. Supply disruptions caused by scarcity, hoarding and withholding of vital resources may cause conflicts within states as groups vie for access. Social groups that are unable to access the necessary materials to allow their population to survive and prosper, either through the markets or bilateral arrangements, may resort to the use of force. The range of outcomes associated with climate-related events heightens this risk.

population

It is estimated that by 2020, Nigeria's population can grow to up to 250 million people, requiring concomitant increases in food supply and water. Because a gap already exists between the present population and the land available for food production, particularly in those areas most vulnerable to

climate change, competition over land usage will increase. Those unable to compete migrate to sprawling urban areas that are likely to outgrow the ability of their hinterland to provide for them.

urbanisation

The pursuit of economic opportunity as the main reason for urbanisation will combine with forced migration, instability and the environmental consequences of climate change. It is estimated that by 2040, about 65% of the world's population will live in urban areas with the majority of the growth coming from Africa and Asia. A considerable proportion will settle in shantytowns that are unplanned and that are likely not to be sustainable. This will increase the burden on resources, an already over-stretched infrastructure and the environment, thus increasing the need for humanitarian assistance. Furthermore, this movement is likely to produce tensions in the urban areas by increasing competition over land, accommodation and access to resources and employment opportunities.

Rapid and uncontrolled urbanisation without commensurate economic growth and industrialisation to develop an effective infrastructure and associated support structures will challenge urban governance and generate regions of instability, poverty and inequality. Most of the urban poor will be employed in the informal sector and will be highly vulnerable to externally driven economic shocks and illicit exploitation capable of triggering civil conflicts. Furthermore, mega cities will emerge but these will contain only some 10% of urban dwellers. 50% of urban dwellers are likely to live in urban areas of less than 500,000 people. These areas are likely to absorb nearly half the projected increase in the urban population and face the greatest shortfalls in infrastructure and service provisions, increasing the risk of environmental disasters leading to insurgency.

global change

Other global events like the crisis in the Euro zone, the 2011 earthquake and tsunami in Japan or the failure of international climate change negotiations to create a legally binding regime all affect Nigeria and exacerbate an already stressful situation. Though Africa is viewed as one of the regions with a high potential for growth, the increased aversion to political and investment risk and a drop in demand from Europe and the USA has resulted in a less trade and investment flows. However, the demand for commodities by the emerging economies remains strong.

The global financial crisis has seen most of Nigeria’s traditional development partners making policy shifts that affect their commitments to existing development agreements. For example, the US Agency for International Development (USAID) in response to a cut of its budget by Congress has cut down its areas of interventions, invariably affecting potential beneficiaries that are vulnerable to climate change impacts.

Worldwide energy shifts to renewables are likely to affect the nation’s oil sector, which has contributed over 90% of the country’s foreign exchange earnings. Climate change response measures are already affecting most oil production countries. This can affect Nigeria’s mono commodity dependent economy if no real diversification or greening of the economy is taking place. A future legally binding agreement under the UN Framework Convention on Climate Change (UNFCCC) is likely to require developing nations to take more urgent domestic action to mitigate and abate the impacts of climate change. Nigeria, with its large growing population and oil dependent economy must seek ways to diversify its economy and broaden the revenue base for implementation of domestic climate actions.

Increased regional cooperation and trans-boundary arrangements in the management of natural resources with neighboring countries, particularly those sharing the Lake Chad and the Niger river basins, would need to be closely managed and strengthened to avoid potential regional conflicts.

The costs of adapting to the trends described above will be very high and will certainly impact on the nation's GDP. Even assuming money was available, it is almost certain that adaptation alone cannot resolve all the problems, as the consequences extend much beyond mere physical changes.

existing policies and intervention options

The government of Nigeria in an attempt to address the climate change challenge, has created the Department for Climate Change in the Ministry of Environment with responsibility for formulating the response to climate change. The Department in collaboration with some development partners has developed the National Adaptation Strategic Plan of Action (NASPA) that provides strategies on climate change in all sectors of the economy and livelihoods. A Nationally Appropriate Mitigation Action (NAMA) document that will guide Nigeria to reduce emissions across all sectors of the economy, including households and industry, is also being developed and could be implemented to facilitate the transition to a green economy.

The ambitious government Vision 2020 aims at rapid economic growth and an increase in annual per capita income to US$ 9,000 from less than US$ 1,000 today. It envisages Nigeria to be one of the world's top 20 economies by 2020. The Vision has ambitious targets to provide energy access, improve healthcare, and expand modern transportation systems and boost agricultural production and export. It also aims to introduce efficiency in oil production, increase utilisation of gas for electricity and stop gas flaring. The Vision advocates a sustainable development pathway that is cognisant of climate change and pursues measures to address climate impacts.

Other government policies on agriculture (NIRSAL), water (National Water and Sanitation policy), land (Presidential Land Reform Committee), energy (the Power Roadmap) and environment (National Policy on Environment), are all geared towards providing life-supporting services to the people of Nigeria. However, none of these policies have fully considered the likely security dimension of climate change impacts on either the specific sector or the nation as a whole.

The present administration has over the last two years made large financial allocations for security under the national budget. This is ostensibly done on accounts of the Niger Delta amnesty programme and terrorist attacks. However, little or no attention is paid to environmental concerns that are likely to trigger further insecurity. Not surprisingly, Nigeria's national security policy is hardly open to public discussion. It, therefore, is and will likely continue to be difficult to appreciate the government's commitment to address climate-induced security problems.

Notwithstanding all the existing policies and measures, it is imperative that the government adopts and vigorously pursues an approach that 'insures' the nation against serious climate security problems, implementing measures that are aimed at providing durable results even if the worst-case environmental changes never occur. This goes well beyond the typical no-regrets policy commonly adopted.

governance options and recommendations

- Nigeria can avoid large-scale human suffering and the related monetary cost by improving the understanding of the nexus between climate change and security and by responding to the need for more information and better management of data. For example, no up-to-date vulnerability assessment exists and because of such knowledge gaps, the linkages between climate change impacts and security cannot be firmly established. Training is crucial to build up the necessary institutional capacity.

- A comprehensive mapping of causes of conflicts, potential conflict hotspots and remedial actors in each state and across ecological regions should be undertaken to assist policy makers in drawing informed conclusion.

- Increasing energy access, particularly from renewable sources, will enhance human and economic development, thereby reducing tension and possibly conflicts. Globally, the "old" economy is fast losing jobs and investment is turning away from old ways of doing things. A program for climate-compatible development can accelerate the deployment of locally appropriate renewable energy technologies that are available, efficient and affordable. A n investment push for renewable energy is needed to create jobs. Small-scale cottage agricultural estates served by irrigation schemes could provide all-year income. Solar–powered mini enterprises will guarantee food security and reduce tension, to give just two examples.

- The adoption of climate-resilient agricultural practices and the provision of affordable climate insurance will help protect poor farmers from the vagaries of climate change and will help to keep them in business. Robust adaptation progra ms will increase agricultural production, which in turn will create new jobs for the large population of youth. Such programs increase the gender-inclusiveness of development while slowing down the trend of rapid urbanisation.

- Concrete regional cooperation must be sought where climate, environmental and security concerns reach across borders, particularly in the management of trans-boundary resources like the Niger river, Lake Chad, the Gulf of Guinea etc.

- Every challenge is an opportunity: the current security threat can potentially unite Nigerians against random violence, but this will only happen if large numbers of people identify with a re-defined national vision. Strong political leadership supported by well-equipped institutions is imperative to create the appropriate linkages between potential trends and intervention options. Strong, competent and development-focused governance will be required to address these complexities.

the risk of failure of interventions

Imagine not…

What happens if Nigeria continues with business-as-usual, allowing resource scarcities and uneven distribution of income from natural resources to foster conflict and strife? A troubling picture emerges where extreme drought and excessive rains force millions of people to move into the middle belt, looking for food, shelter and employment. In the absence of trusted institutions that are capable of handling emergency situations, people will stand up for themselves and their families, opening the door to more ethnic and religious conflict. Water and land may become so scarce that guards need to be posted around farm land and water wells. Vigilante groups will have the potential to turn defensive action into aggression against neighbors and other perceived enemies. Almost every parcel of land will be claimed by multiple owners as traditional and government systems of managing land ownership are not reconciled. International agribusiness companies will defend large-scale farms with capital-intensive precision agriculture for export in the midst of teeming, desperate communities. Government at the state and federal level will be unable to direct internally displaced people to settlements where they could rebuild their lives because hardly any surveys are available to show what to grow where and how to feed so many people on such limited space. In some border areas, people will be migrating between Nigeria, Cameroon, Chad, Benin on a seasonal basis, going where the rains fall and where the rivers flow. In the absence of cross-border agreements, the governments of these countries will accuse each other of supporting illegal migration and conflict rather than seeking to support the people in finding food and livelihoods...

conclusion

Increasing the knowledge and understanding of the security implications of climate change is important for the sustainable development of any country, particularly for those most vulnerable to climate change. It is now widely accepted that there is an urgent need for the government to support the creation of jobs for the teeming youths, particularly in the rural areas. This will reduce internal migration and rapid urbanisation and thus the risk of urban insurgency. Agriculture currently employs over 60% of the workforce. The sector and especially the associated industries can potentially create more employment. Support for rural small and medium-sized industries should be prioritized. These can be powered by clean energy from renewable sources. The optimal utilisation of the nation's renewable energy resources will thus create employment and reduce the scope for conflict. Public participation of the poor and most vulnerable in decision-making and planning of interventions is much-needed and will help reduce tension. Given the high conflict-potential, the existing regional cooperation platforms for the management of the Niger river and the Lake Chad basin, which are important sources of water, energy, food and jobs, should be transformed to reduce competition over resources. Finally, the government's adaptation and

mitigation programmes should be used as entry points for integrating security considerations into national development plans.

> *"They will have to listen to the cry of the masses. Even with all the cries of the masses, they harden their hearts."*
>
> *ABC1, 16 – 20, Female, Lagos*[4]

> *"Another thing is if the government is determined to change this nation, this nation will change … so now, if I say I must achieve this particular aim in fifty years time, it is my duty to work towards it seriously. … If the Government should do so that I am determined to drive corruption out of this country, no matter who is involved even if it is my wife or my husband or my son or my daughter, they can."*
>
> *ABC1, 20 – 25, Female, Abuja Urban*[5]

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[4] *2020 - Young Nigeria's Perceptions*, research commissioned by hbs, May 2012

[5] *2020 - Young Nigeria's Perceptions*, research commissioned by hbs, May 2012

What does Nigeria's future look like when the oil runs out?
How do we transition from an oil-dependent economy to a more sustainable society?
How to share with millions of Nigerians the wealth created through green development?
Where would green jobs be created and will Nigeria remain a largely agrarian country?
What will happen if the country does not squarely deal with the ravages of climate change?

By formulating answers to these questions, the *Green Deal Nigeria* study contributes to an increasingly intense debate on how to transition Nigeria to a green economy that is low carbon, resource efficient and socially inclusive. Nigeria is in an unusual position compared to other sub-Saharan African countries as it contributes to global warming through massive gas flaring and bush burning, whilst enduring desertification, sea level rise and extreme weather events that contribute to land degradation and intensify conflict.

The concept of a Green New Deal gathered strength as a response to the 200 financial crisis. estern governments were urged to, rather than supporting fossil-fuel industries and business-as-usual, start a Great Transformation that would address global warming and deliver development for all. Nigeria does not have a large enough industrial base, but the need for a transition from a fossil to a greener economy is all the more pertinent. Nigeria s people who have been largely excluded from the spoils of the oil industry need a deal that tackles the grinding poverty and creates access to development. Living in times of global climate stress, this deal should better be a *Green Deal for Nigeria*.

Some Nigerians are using the Rio+20 summit as the starting point for a participatory ongoing debate on the country s transition towards a green economy that would allow its teeming and often unemployed population to improve their livelihoods, avoid destroying the country s natural resource base and restore trust in government. By commissioning this study, the Heinrich Böll Foundation wants to make a contribution to this debate and invites Nigerian women and men to comment on and re-shape the ideas contained herein:

Please log onto www.ng.boell.org to share your views, or tweet on #GreenDealNigeria.

HEINRICH BÖLL STIFTUNG
NIGERIA