

**Re-defining Energy Security in Nigeria
through
Climate Change Risk Regulation**

By

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ABSTRACT

This thesis examines the observed and anticipated impacts of climate change on energy security. Specifically, by incorporating emergent international legal obligations and regulations governing climate change, this thesis proposes a definitional and policy framework for energy security that can assist in making Nigeria's energy supply more secure. This, in turn, can serve to improve Nigeria's capacity to meet current and future climate change obligations. While the principal objective of this thesis is to explore how global climate change risk regulation provides opportunities for the state to improve energy security in Nigeria, this thesis emphasizes that Nigerian law should aim to create a balance between the dual objectives of energy security and climate change responses. Using the theory of legal transplantation, further insights for integrating climate and energy security goals to develop the definitional and policy framework of energy security in Nigeria are gained through an examination of bold initiatives taken by Germany.

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DEDICATION

I dedicate this thesis to God and my wonderful parents, 'Sola and 'Bola, who have enlightened my journey on this earth with their remarkable virtue and brilliant genius.

INTRODUCTION

Introduction

The use of energy is a pre-requisite for virtually every economic activity, and it is crucial to be able to consistently access sufficient amounts of energy at an affordable cost, both from environmental and economic perspectives - this is the basic notion of energy security.¹ Climate change is arguably poised to be the greatest environmental and economic challenge of our time.² The impacts of climate change from rising temperatures to glacial melting and rising sea levels threaten global energy security.³ Thus any rigorous examination of energy security requires evaluation of climate change risk within the context of energy security objectives and vice versa.

Even without factoring in climate change risk, the present energy system in Nigeria has ongoing, unanswered energy security risks. For example, the state of the Nigerian energy sector has been consistently described as inefficient, this inefficiency chiefly attributed to the lack of diversification of energy sources.⁴ In particular, the lack of diversification renders the sector severely vulnerable to energy emergencies. When climate change risk and threats are factored in, the particular vulnerability of the largely homogenous Nigerian energy sector becomes more obvious.

¹ Caroline Kuzemko, *The Energy Security-Climate Nexus: Institutional Change in the UK and Beyond* (London: Palgrave Macmillan, 2013). The detailed discussion of the concept of energy security is provided in Chapters 3 and 4.

² Carlo Fanelli, "Climate Change: The Greatest Challenge of Our Time" (2014) 25 *Alternate Routes: A Journal of Critical Social Research*; Naomi Oreske & EM Conway, *The Collapse of Western Civilization: A View from the Future* (New York: Columbia University Press, 2004); C Hepburn & N Stern, "A New Global Deal on Climate Change" (2008) 24 *Oxford Rev of Economic Policy* 259-279; see also, Nicholas Stern, *A Blueprint for a Safer Planet: How to Manage Climate Change and Create a New Era of Progress and Prosperity* (London: Bodley Head Vintage Publishing, 2009).

³ Marcus Dubois King and Jay Gullede, "Climate Change and Energy Security Nexus" (2013) 37:2 *The Fletcher Forum of World Affairs* 38; David Toke & Sevasti-Eleni Vezirgiannidou, "The Relationship between Climate Change and Energy Security" (2013) 22:4 *Environmental Politics*; Bazilian Morgan, et. al., "Interactions between Energy Security and Climate Change: A Focus on Developing Countries" (2011) 39:6 *Energy Policy* 3750-3756; see also, B Stephen, PA Huntington & G Hillard, "Energy Security and Climate Change Protection: Complementarity or tradeoff?" (2008) 36:9 *Energy Policy* 3510-3513.

⁴ Adeola Adenikinju, "Efficiency of the Energy Sector and Its Impacts on the Competitiveness of the Nigerian Economy" (2008) *International Association for Energy Economics* 27-29; Tallapragada, P.V.S.N and B.S. Adebuseyi, "Nigeria's Power Sector: Opportunities and Challenges", in P. Collier, C. Pattillo and C.C. Soludo, eds., *Economic Policy Options for a Prosperous Nigeria* (New York: Palgrave Macmillan, 2008) 301 - 327.

If global regulatory trends are anything to go by, there appears to be increasing call for states to develop energy policies and practices that are progressive and “climate-smart” (such trends further discussed in Chapter One). Thus, the analysis herein describes the centrality of the energy sector to Nigerian economic growth and development while exploring how Nigerian energy policies and practices defeat the overarching goal of energy security by not concurrently addressing - and integrating - climate change goals and responses. This thesis therefore sets out to identify the regulatory and policy linkages between the dual goals of climate change response and energy security which in turn supports the position that the diversification of the Nigerian energy sector is required.

Indeed, this thesis posits that emergent climate change risk regulation requires Nigeria to carefully consider the development of a revised, integrated definition of energy security aimed at prompting legal and policy regimes that can stimulate promotion of energy sector diversification. As will be discussed, an integrated definition of energy security is the key to being able to meet demands of climate change risk regulation without compromising domestic energy security objectives.⁵ The central claim of this thesis is that Nigeria should employ a balance between the dual objectives of energy security and climate change responses. Both objectives being essential and neither enjoying primacy over the other. In this way, climate change responses should capture energy security policy objectives, equally and fairly, rather than simply capturing conventional energy interests. As will be discussed, for Nigeria it is critical to avoid holding climate policy hostage to the entrenched interests of energy security and vice versa.

In addition to the overall integration of energy security and climate change regulation, further insights for evolving the definition and policy framework of Nigerian energy security are gained through the examination of recent and bold initiatives taken by Germany. Germany has not only expressly considered the interface between energy security and climate change but has actually taken the further step of implementing policies to diversify its energy sector; making its energy supply not only more secure and reliable but also more environment-friendly. It is the author’s

⁵ For example, for the Nigerian energy industry to survive the observed and anticipated risks and threats that climate change poses to energy security, Nigeria ought to consider deploying its wind, solar, hydro, and other non-fossil fuels zero-emission generation capacity and reducing its reliance on the conventional oil, gas, and coal that are the greatest emitters of carbon and greenhouse gases. This is discussed further in Chapter One.

view that Nigeria could stand to gain insights from Germany's delimitation of energy security and climate change concepts.

Germany was selected by the author as a comparator for Nigeria because the German government developed an integrated energy and climate scheme that was without precedent in the history of Germany's energy policy as well as globally. In fact, there is no other similar industrial country that has an equally bold and concrete integrated strategy as Germany.⁶ Germany has achieved more than 18 percent reduction in GHGs emissions compared to 1990 levels.⁷ This integrated energy security and climate change scheme will also enable Germany to achieve a reduction of GHGs emissions by 36 percent which is a crucial step toward achieving its climate security target of 40 percent reduction in GHGs emissions by 2020. Therefore, Germany offers one model of an efficient and diversified energy industry that Nigeria can fashion its legal and policy reforms upon with respect to energy security and climate change response objectives.

This comparative approach, however, also raises the practical matter of the feasibility or transference of legal rules from one country to another. While an in-depth review in this regard is beyond the scope of this thesis due to space limitation, the author nonetheless raises this for the reader as an important matter for consideration and addresses, albeit briefly, the suggested German comparator through the lens of the theory of legal transplantation in Chapter Four of this thesis.

To summarize, the study herein explores the interactions between the dual goals of promotion of climate change responses and improved energy security. Perhaps though more distinctively, the definitive goal of this thesis is to offer an innovative and integrated definition of "energy security" and propose the legal framework established on principles of *resilience* and *climate-energy sovereignty* in order to stimulate diversification in the largely homogenous Nigerian energy sector. This in turn will improve the ability of Nigeria to comply with emergent and

⁶ Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, *The Integrated Energy and Climate Programme of the German Government* (Bonn: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, 2007) 1.

⁷ *Ibid.*

future international climate change obligations. Thus, this thesis carefully considers energy security as the *principal means* through which both Nigerian energy sector objectives and climate change objectives can be promoted within Nigeria.

The thesis concludes by providing some practical recommendations with a view to reforming the Nigerian energy industry. In keeping with the goal of achieving balance between the dual objectives of energy security and climate change responses, it is the author's hope that the law and policy reform recommendations along with the revised definition of "energy security" offered herein will help to stimulate investment in clean technologies and the overall reduction in Nigeria's greenhouse gas emissions and the acceleration of Nigeria's transition to a low-carbon economy.

Scope and Objectives

This thesis explores and challenges the concept and definition of energy security in Nigeria by examining it against climate change causes and its observed/anticipated risks and threats to the Nigerian energy sector; the risks and threats having been identified through current international legal obligations and regulations governing climate change.

This study considers the interactions between the promotion of climate change objectives and improved energy security as well as demonstrates a modest methodology to identify and assess the impact of and interactions between climate change risk regulation and energy security policies. It is hoped that that this discussion will assist in guiding future policy-making by identifying the areas and the extent to which climate change responses can strengthen energy security objectives and vice versa.

Accordingly, the thesis reviews some of the most aggressive global and domestic regulatory responses to the climate change problem and the impacts/influence on energy security that they project, particularly with respect to impacts on Nigeria. It conducts an analysis of the Nigerian energy industry and describes the essential features of the industry of most relevance to Nigeria in the context of energy security and climate change. The thesis then expressly introduces the concept of energy security and goes on to critically analyze global definitions of energy security

as well as definitions specific to the Nigerian law and policy context. Then, along with insights gleaned from Germany's approach to energy security (keeping in mind the limitations of this comparator as already identified above), the thesis explores energy security against the backdrop of climate change risk and regulation in order to offer the reader an integrated and revised definition of energy security.

This thesis concludes by making recommendations with a view to reforming the Nigerian energy industry through an infusion of climate change risk regulation and ultimately recommends the encouragement of diversification in its energy generation capacities.

This thesis does not engage in the debate over whether climate change is real or not, rather, this thesis assumes that the risk is real, relying not on the science for this position, but rather on the global legal and regulatory responses to climate change risk, hence the term used throughout this thesis – “climate change risk regulation”. That said, because it is important to have a sense of what the anticipated risks are from a natural sciences perspective (the catalyst behind global regulatory responses), this thesis does include a broad overview of anticipated and projected climate change effects in Chapter One.

Summary of Literature Review

The literature review undertaken has demonstrated to the author that the relationship and nexus between climate change and energy security has not been the subject of sufficient academic discourse. For example, much of the debate on climate change has been scientific focussing on the contributory effects of fossil fuels on climate change. Little discussion has centered on the observed or anticipated impacts of climate change on energy security.

Indeed, there are remarkably few studies available that examine the impacts of climate change on energy security and energy use in Africa, and particularly with respect to Nigeria. Much of the published research and literature on the relationship between energy law and environmental law in Nigeria have focused on the contributory effects of fossil fuels on climate change with little

analysis of the observed and anticipated impacts of climate change on energy security.⁸ In practice, climate change risk considerations seem to take a “back-seat” to energy sector and energy production considerations.⁹

However, even in the absence of urgency for immediate responses to general climate change forecasts, a number of other changes are anticipated for the energy sector in the developing world. For example, the recent rapid urban growth in Africa is projected to lead to increases in aggregate commercial energy demand and emission levels.¹⁰ These anthropogenic changes are altering existing surface microclimates and hydrology and in turn will possibly exacerbate the scope and scale of climate change impacts on energy security; hence, in the author’s view, necessitating the need for the study of climate change risks and impacts on energy security in the developing world. To support this position, the author points out that a significant portion of the existing literature on climate change focuses on aspects of climate change as a “threat multiplier”¹¹ for, for example, instability, conflicts and indeed, violent conflicts particularly in areas that are experiencing or will most likely experience the problem of scarce resources as a result of climate change impacts, e.g., Africa and the Middle East.¹² The impacts of climate

⁸ See for example, Opeyemi Akinyemi, Adeyemi Ogundipe & Philip Alege, “Energy Supply and Climate Change in Nigeria” (2014) 4:14 *Journal of Environment and Earth Science*; Usenobong F. Akpan and Godwin E. Akpan, “The Contribution of Energy Consumption to Climate Change: A Feasible Policy Direction” (2012) 2:1 *International Journal of Energy Economics and Policy*; OA Olaniyi, ZO Ojekunle & BT Amujo, “Review of Climate Change and Its Effect on Nigerian Ecosystem” (2013) 1 *International Journal of African and Asian Studies*.

⁹ See for example, Anthony Giddens, *Politics of Climate Change* (Cambridge: Polity, 2009); John Deutch, Anne Lauvergon & Widhyawan Prawiraatmadja, *Energy Security and Climate Change* (Washington, Paris, Tokyo: The Trilateral Commission, 2007) online: <http://trilateral.org/download/doc/Energy%20Security.pdf> (accessed 31 January 2016).

¹⁰ See, Davidson et al, “The Development and Climate Nexus: The Case of Sub-Saharan Africa” (2003) 3:1 *Climate Policy* 97-113; ML Parry et al., eds., *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, UK: Cambridge University Press, 2007); Graham Floater et al., “Cities and the New Climate Economy: the transformative role of global urban growth” *The Global Commission on the Economy and Climate – The New Climate Economy* online: <https://files.lsecities.net/files/2014/12/The-Transformative-Role-of-Global-Urban-Growth-01.pdf> (accessed 31 January 2016).

¹¹ Gordon Sullivan et al, *National Security and the Threat of Climate Change*, Centre for Naval Analyses (Virginia: Centre for Naval Analyses, 2007) Online: <http://www.cna.org/reports/climate> (accessed 20 November 2015).

¹² Jon Barnett & Neil W Adger, “Climate Change, Human Security, and Violent Conflict”, *Political Geography* 26 <http://waterwiki.net/images/7/77/> (accessed 20 November 2014); Dan Smith and Janani Vivekananda, “A CLIMATE OF CONFLICT: The links between climate change, peace and war” (2007) *International Alert* online: http://www.international-alert.org/sites/default/files/ClimateChange_ClimateOfConflict_EN_2007_0.pdf (accessed 1 February 2016); Donald Anthony Mwiturubani et al., “Climate Change and Natural Resources Conflicts in Africa” (2010) *Institute for Security Studies* online: <https://www.issafrica.org/uploads/Mono170.pdf> (accessed 1 February 2016).

change as “threat multiplier” from the perspective of energy security in developing nations, however, has not been extensively studied.

Instability in developing nations can affect energy systems in a variety of ways, however, the threat in which policymakers and security organizations from more developed nations appear to be most interested is the interruption of energy supply, particularly with respect to oil supply. Accordingly, the literature extensively explores the issue of energy supply interruption and reveals that climate change’s potential to trigger conditions that may interrupt oil supply is most likely to occur in Africa.¹³ The literature also describes that energy systems can be attractive targets for attack when conflict ignites as a result of climate change impacts.¹⁴

Similarly, previous reports on the physical impacts of climate change, such as the Intergovernmental Panel on Climate Change (IPCC) global climate assessment,¹⁵ have focused on the impacts of climate change on natural systems and human health. These studies help to identify how imperative it is for Nigeria to ensure secure energy supplies at affordable rates with regard to the environmental policies and impacts and the building of resilient and reliable energy systems in order to ensure sustainable national development. But again, this simply illustrates the concept of energy security without true integration of climate change response objectives. Accordingly, a clear connection and relationship between climate change response policies and energy security policies will be identified in this thesis. Indeed, the paper will demonstrate that

¹³ Marcus Du Bois King and Jay Gullede, *supra* note 3; M. Werz and L. Conley, “Climate Change Migration and Conflict in Northwest Africa: Rising Dangers and Policy Options across the Arc of Tension,” (2012) Center for American Progress online: http://www.americanprogress.org/issues/2012/04/climate_migration_nwafrica.html; (accessed 1 February 2016); S. Mantshantsha, “South Sudan says it will build oil pipelines worth \$4 billion,” Bloomberg News (June 7, 2012) Bloomberg News online: <http://www.bloomberg.com/news/2012-06-07/south-sudan-says-it-will-build-oil-pipelines-worth-4-billion.html> (accessed 1 February 2016); Steve Bloomfield, “Africa ‘will be worst hit by climate change’” Independent (5 November 2006) Independent online: <http://www.independent.co.uk/environment/climate-change/africa-will-be-worst-hit-by-climate-change-423143.html> (accessed 1 February 2016); Meles Zenawi, “Climate change will hit Africa hardest” The Guardian (28 November 2009) The Guardian online: www.theguardian.com/commentisfree/cif-green/2009/nov/28/africa-climate-change (accessed 1 February 2016).

¹⁴ M Werz & L Conley, “Climate Change Migration and Conflict in Northwest Africa: Rising Dangers and Policy Options across the Arc of Tension” (2012) Center for American Progress: http://www.americanprogress.org/issues/2012/04/climate_migration_nwafrica.html (accessed 23 November 2014).

¹⁵ RK Pachauri et al., *Climate Change 2014: Synthesis Report: A Contribution of Working Groups I, II, III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, England: Cambridge University Press, 2014).

policies designed to mitigate climate change and promote energy security can be mutually reinforcing.

Through the lens of energy security, most secondary literature focuses on energy security in the global North and the developed world. Yet, the literature on climate change impacts predominantly focuses on developing countries. Thus for example, Nigerian climate change literature largely focuses on the impact of climate change in isolation from energy security. A research agenda emphasizing energy security is needed that includes greater emphasis on developing nations where: climate impacts are expected to be especially severe; the resilience of energy systems to withstand those impacts is low; and many countries depend on energy exports for economic growth.¹⁶ Such a research agenda should also examine potential threats of the climate change impacts on human security. Climate change and energy security are concepts that require analysis on both trans-boundary and household scales.

Due to the complexity of the decisions policymakers must tackle, a literature that fully considers climate change and its consequences for energy security requires an interdisciplinary approach; yet interdisciplinary capacity remains limited in academia, with some notable exceptions.¹⁷ Moreover, the grey literature - which is more directly responsive to policymakers' needs - offers insight into their thinking and can be a valuable tool in guiding academic research as it reveals salient gaps in available scholarly analysis.¹⁸ Furthermore, because the literature tends to be more responsive to the research needs of practitioners who tend to operate in their particular practice silos, the gaps identified indicate that policymakers are still largely unaware of some key implications of the climate change and energy security connection.

Finally, climate change may affect how energy is produced and consumed in future. Warmer regions may be exposed to rising electricity demand for cooling in the summer. Warming can also affect electricity supply as plants that need water and air for cooling face new challenges. At

¹⁶ Marcus Du Bois King and Jay Gullede, *supra* note 3 at 39.

¹⁷ See for example, J Gullede & W Rogers, "Lost in Translation: Closing the Gap between Climate Science and National Security Policy" (2010) Center for New American Security: <http://www.cnas.org/node/4391> (accessed 22 November 2014).

¹⁸ *Ibid.*

the same time, sea level rise and flooding pose challenges for energy infrastructure¹⁹ and the transport of energy goods. In order to enhance energy security in the face of the prevailing conditions, it is imperative to jump-start a conversation about this issue to create active discussions among all stakeholders with the aim of improving future resilience to climate impacts and emergent regulation.

Accordingly, there is a need for creation of a legal and policy regime capable of instigating a clean energy revolution towards the achievement of the dual objectives of energy security and climate change responses.

Justification of the Study

Based on the literature review, the following question emerges: Is *energy security* a principal means through which climate change objectives and energy sector objectives can be promoted in Nigeria?

The above stated question is important because a preliminary yet thorough study of climate change and energy security concepts has allowed the author to identify gaps in the various legal and policy responses to the matter of climate change in relation to energy security and vice versa. Intriguingly, a thorough analysis of climate change in the context of energy security allowed the author to identify Germany as a country that appears to have approached climate change and energy security in tandem and has gone a long way to diversify its energy generation capacities by investing in renewable energy and clean energy technology. Accordingly, there are valuable lessons from Germany that may be useful in the Nigerian context, and ought to be explored.

The importance of study in this area cannot be overemphasized. It is no exaggeration to say that “climate change” is one of, if not the greatest, international challenges of our time. Indeed, it is

¹⁹ Climate Change and Infrastructure, Urban Systems, and Vulnerabilities, *Technical Report to the U.S. Department of Energy in Support of the National Climate Assessment* (Department of Energy Oak Ridge Office and UT-Battelle, LLC, 2012).

the most internationally discussed topical issue in recent times particularly among world leaders who are fully aware of the consequences and risks of this phenomenon.²⁰

Therefore, it is this author's hope that urgent and critical discussions and debates and the study of climate change from another perspective; that is, the energy security perspective, will assist in efforts of the international community to address the problem of climate change.

This thesis is written in simple language with a preference for non-legalese in order to promote the understanding of the public and policymakers with a view to encouraging all social actors to assume their various roles in the climate change and energy security debate.

Methodology

As described, this thesis attempts to instigate a discussion that will amplify climate change responses and energy security objectives in Nigeria beyond mere political rhetoric by bringing these two concepts together in the form of a challenge to the concept and definition of energy security through the imposition and infusion of climate change policy and emergent international climate change risk regulation.

To accomplish the foregoing, this study considers the impacts and interactions between climate change responses and objectives and energy security policies. It is hoped that this will assist in laying the groundwork to guide future policy-making by identifying the areas and the extent to which climate change responses can strengthen energy security objectives and vice versa.

²⁰ "This one trend, climate change, affects all trends. If we let the world keep warming as fast as it is and sea levels rising as fast as they are, and weather patterns keep shifting in more unexpected ways, then before long we are going to have to devote more and more and more of our economic and military resources not to growing opportunity for our people, but to adapting to the various consequences of a changing planet" – Barack Obama, 44th and current president of the United States of America - See, Angela Greiling Keane and Justin Sink, "U.S. Will Keep Commitments in Paris Climate Deal, Obama Says" Bloomberg L.P (1 December 2015) online: <http://www.bloomberg.com/politics/articles/2015-12-01/u-s-will-keep-commitments-in-paris-climate-deal-obama-says> (accessed 1 February 2016); "We are the forgotten ones, although we suffer every day from climate change" - Diallo Déidia Mahamane Kattrra, a former minister for employment in Mali – See, Nicholas St. Fleur, "The Road to a Paris Climate Deal" The New York Times (2 December 2015) online: <http://www.nytimes.com/interactive/projects/cp/climate/2015-paris-climate-talks> (accessed 1 February 2016).

The analytical approach to this study focuses on the use of the empirical, doctrinal, comparative and international research methodologies to assess the linkages between climate change and energy security. This includes an examination of Germany's energy security definition from the climate change perspective in order to gain insights for the improvement of response from the Nigerian energy industry to energy emergencies that could occur as a result of the potential climate change risks and threats as gleaned through climate change risk regulation.

Further, the approach to this study aims to be flexible and easily updateable because the present modeling assessments of the impact of climate policies on the energy system and energy security will undoubtedly need to be revised and modified in the nearest future as new findings are made.

Structure of the Thesis

This thesis reviews some of the most aggressive global and domestic regulatory responses to the climate change problem and projects the impacts/influence of these responses on energy security, particularly with respect to Nigeria, in order to provoke reform of the definition of energy security which in turn arguably has the traction to move climate change reform from mere political rhetoric into action.

After setting the stage through review of climate change (definitions, policies and regulatory responses), the thesis conducts an analysis of the Nigerian energy industry to describe the essential features of the industry of most relevance to Nigeria. The thesis then expressly introduces the concept and objectives of energy security and goes on to critically analyze global definitions of energy security as well as energy security definitions specific to the Nigerian law and policy context. Then along with insights gleaned from Germany's integrated approach to climate change and energy security, the thesis brings climate change risk regulation and energy security objectives together in order to offer the reader an integrated and revised definition of energy security for Nigeria. This thesis concludes by making recommendations for reform of the Nigerian energy industry and includes a recommendation to encourage diversification in its energy generation capacities.

With a view to the foregoing, this thesis is divided into five main chapters (excluding this general introductory section).

Chapter One entitled, “Climate Change Considerations” establishes the conceptual foundation for this discussion by explaining the overarching issue of what is climate change and why climate change ought to be considered in the context of energy security and vice versa. Accordingly, this chapter, in Part 1.2, explains the concept of climate change and its perceived causes; it also summarizes the observed and anticipated impacts of climate change and the risks/threats that climate change specifically poses to energy security in Nigeria. Leaving scientific projections aside, Part 1.3 turns to the wholly non-debatable aspect of climate change, the actual international legal and regulatory responses to climate change i.e. climate change risk regulation. Part 1.3 thus begins with an analysis of international legal response(s) to climate change and summarizes the activities of: the International Panel on Climate Change (IPCC) and also reviews the 1992 UNFCCC²¹ and the 1997 Kyoto Protocol,²² respectively. Subsequent summits of the Conference of the Parties to the UNFCCC and the outcomes of those summits are also addressed, viz.: the Bali Conference²³; the Copenhagen Accord;²⁴ the Cancun Agreements;²⁵ the Durban Agreements;²⁶ the Doha Climate Gateway;²⁷ Lima Accord for Climate Action²⁸. Part 1.3 ends with an overall summary of the broad themes emerging from international responses to climate change. Part 1.4 turns to the domestic environmental law perspective and examines Nigeria’s domestic legal responses and policies to climate change and in particular reviews the NESREA Act, 2007²⁹ along with the Climate Commission Bill³⁰ and the National Institutional Framework for Climate Change Response. Part 1.4 also explains some of the key constraints in implementing such domestic environmental laws and policies. Part 1.5 brings the international

²¹ *United Nations Framework Convention on Climate Change*, 9 May 1992, 1771 UNTS 107, art 1, 31 ILM 849 (entered into force 21 March 1994) [UNFCCC]

²² UN Doc FCCC/CP/1997/7/Add.1, Dec. 10, 1997; 37 ILM 22 (1998) (entered into force 16 February 2005)

²³ UN Doc FCCC/CP/2007/6/Add.1, Mar. 14 2008.

²⁴ UN Doc FCCC/CP/2009/L.7, Dec. 18 2009.

²⁵ UN Doc FCCC/CP/2010/7/Add.1, Mar. 15 2011.

²⁶ UN Doc FCCC/CP/2011/L. 10, Dec. 10 2011.

²⁷ UN Doc FCCC/CP/2012/L. 13, Dec. 7 2012.

²⁸ UN Doc FCCC/CP/2014/L. 14, Dec. 13 2014.

²⁹ *National Environmental Standards and Regulations Enforcement Agency (Establishment) Act No. (25) 2007 94:92. [NESREA Act].*

³⁰ A Bill for an Act to Establish the National Climate Change Commission and for Other Related Matters Connected Therewith, 2011, [HB. 30] No. C 531-C 540.

and national regulatory perspectives together to illustrate the potential impacts of climate change risk regulation (if implemented) on energy security in Nigeria and summarizes Nigeria's future potential obligations under the climate change regulatory regime. The chapter then offers in Parts 1.6 and 1.7 respectively, a preliminary position on the nexus between climate change and energy security from the climate change regulatory perspective and an opening projection of the impact(s) of global climate change mitigation strategies on energy security in Nigeria.

The discussion turns from these overarching climate change considerations to the Nigerian Energy Industry in Chapter Two. After an introduction to the Chapter in Part 2.1, Part 2.2 tackles current issues and challenges of the Nigerian energy industry, exploring the essential features of the Nigerian energy industry in Part 2.2.A from which the main policy objectives of the Nigerian energy industry are extrapolated in Part 2.2.B and followed by a summary of issues and challenges in Part 2.2.C. Part 2.3 then conducts a preliminary analysis of the projected impacts of climate change (as understood from Chapter One evaluation of climate change risk regulation) on the Nigerian energy industry. Also, Part 2.3 reviews the pattern of energy consumption in Nigeria in order to promote energy conservation measures and the development of modern/clean energy alternatives by taking into consideration the increasing population growth and the understanding that the available oil and gas resources are limited and exhaustible. Chapter Two concludes with preliminary observations in Part 2.4 aimed at summarizing the salient issues regarding the Nigerian energy industry as understood from climate change perspectives.

Chapter Three turns specifically to the matter of "energy security" with a view to deconstructing the concept of energy security from the perspective of climate change risk regulation in order to be analytically positioned to articulate a new integrated definition of energy security. Accordingly, following an introduction to the chapter in Part 3.1, definitions of "energy security" are canvassed, with Part 3.2 exploring global definitions of energy security and Part 3.3 exploring definitions of energy security from - and most relevant to - Nigerian law and policy. Part 3.4 summarizes the key policy objectives of energy security and proposes a first iteration of a revised definition of energy security. Part 3.5 critically assesses this first iteration to determine if it is sufficient for responding to climate change risk and offers a second revision to the definition formulated through incorporation with climate change risk regulation. Chapter Three as with the other chapters ends in Part 3.6. with some additional observations.

Chapter Four explores Germany's integrated approach to energy security and climate change. Following an introduction to the chapter in Part 4.1, Part 4.2 introduces the theory of "legal transplantation" to raise the question of the overall feasibility of "moving" German law and policy to Nigeria. Establishing that such a transplant is indeed feasible, Part 4.3 continues with the discussion of why Germany's energy security model is being studied for the purpose of gleaned insights for Nigerian implementation. Part 4.4 investigates Germany's energy security and climate change initiatives and Part 4.5 summarizes the German definition of energy security as well as its energy security policy objectives. Using insights gleaned from Germany, Part 4.6 offers a re-iteration and revised integrated definition of energy security for the Nigerian context. The Chapter concludes with further observations in Part 4.7.

Chapter Five concludes the entire findings from the foregoing chapters by providing a summarized list of recommendations that may assist the Nigerian government in developing an integrated approach to energy security and climate change. Chapter Five also provides suggestions for the more effective implementation of Nigeria's National Energy Policy, 2013 (NEP) and the Renewable Energy Master Plan, 2005 (REMP) (discussed in Chapter One). The objective here is to identify suggestions and recommendations that are more pragmatic (as opposed to simply theoretical) particularly so as to enable the country to successfully tackle its energy insecurity, climate change, and other environmental challenges hopefully with the outcome of assisting Nigeria to reach the enviable position of leadership in a world transitioning to a clean energy future.

Chapter Six, an addendum to this thesis, briefly explains the Paris Climate Agreement – the first-ever legally-binding global climate accord adopted at the Paris Climate Conference (COP 21) in December 2015. This review is necessary because the Paris Agreement bridges the gap between today's policies and climate-neutrality before the end of 2020.³¹

³¹ European Commission, "Paris Agreement" online: <http://ec.europa.eu/clima/policies/international/negotiations/future/index_en.htm> (accessed 3 February 2016).

CHAPTER ONE: CLIMATE CHANGE IN PERSPECTIVE

1.1. Introduction

Humanity stands at a defining moment in history. We are confronted with a perpetuation of disparities between and within nations, a worsening of poverty, hunger, ill health and illiteracy, and the continuing deterioration of the ecosystem on which we depend for our well-being. However, integration of environment and development concerns and greater attention to them will lead to fulfillment of basic needs, improved living standards for all, better protected and managed ecosystems and a safer and more prosperous future. . .¹

The above does not only describe the state of the human race in this 21st century, it also identifies a problem that has been described as the probable “Third World War”; that is, nature against man. This problem of the continuing deterioration of the ecosystem, as mentioned above, is best described by the now prevalent term; “**climate change**”. The issue of climate change acquired international concern since the beginning of the last quarter of the 20th century and the beginning of the 21st century. It has become arguably one of the most topical issues with all nations and people of the earth anxious to stem the tide in order to save mankind from impending catastrophe, not the least of which includes the drive for actual “integration of environment and development concerns”. Therefore, there is a need to explore the linkages between energy security² and climate change.

¹ *Report of the United Nations Conference on Environment and Development held at Rio de Janeiro from 3 to 14 June, 1992. Agenda 21 UNGA A/RES/47/190, Preamble to Chapter 1 of Rio Declaration on Environment and Development, A/CONF.151/26 (Vol. 1), [UNCED].*

² Energy security discussed further in Chapter Three of this thesis can be described briefly as the ability of households and businesses to accommodate disruptions of supplies in energy markets at the micro-economic level. See Michael Toman, “The Economics of Energy Security” in AV Kneese and JL Sweeney, eds., *Handbook of Natural Resource and Energy Economics* (Amsterdam: Elsevier B.V./North Holland, 1993); World Economic Forum, “The New Energy Security Paradigm” (2006) Energy Vision Update; Lutz Kilian, “The Economic Effects of Energy Price Shocks” (2008) 46:4 Journal of Economic Literature 871-909. A broader definition of energy security incorporates the availability of adequate, reliable, and affordable energy. See BC Staley et al., “Evaluating the Energy Security Implications of a Carbon-Constrained U.S. Economy” (2009) World Resources Institute, Center for Strategic and International Studies. The Center for a New American Security (CNAS) defined energy security as maintaining energy supplies that are environmentally stable, physically secure, and geopolitically reliable. See Sharon Burke and Christine Parthemore, *A Strategy for American Power: Energy, Climate and National Security* (Washington, DC: Center for a New American Security, 2008) online: http://www.cnas.org/files/documents/publications/Burke_EnergyClimateNatlSecurity_June08.pdf.

In this chapter, climate change and its observed and projected impacts on human and natural systems will be reviewed given that it is necessary to specifically examine the risks and threats that a changing climate system potentially poses to energy security in Nigeria.

A description of the science of climate change is provided along with an overview of projected impacts in order to illustrate for the reader the underlying catalyst that is leading legal reform initiatives internationally and nationally. Accordingly, while some may debate the science and view with skepticism, the projections of climate change and its impacts, this thesis, premises its analysis on what the author views as the wholly non-debatable aspect of climate change – “climate change risk regulation”. In other words, whether or not one views climate change as real, the underpinning for the exploration and recommendations made herein is based on the legal initiatives that have been undertaken in the international legal forum and captured within the domestic legal framework. Again the purpose of this thesis is not to debate whether climate change exists, but rather to see how energy security might be used as the principal means to implement climate change regulation which in turn can improve energy security outcomes while reducing factors which have been identified as increasing climate change impacts. This iterative and integrated policy approach to climate change and energy security, in the view of the author, will also poise Nigeria to not only comply with emergent and future climate change obligations but could also establish Nigeria as one of the leaders in a world transitioning to a clean energy future.

Accordingly, following a discussion on climate change impacts and some initial observations on the linkages between climate change and energy security, this chapter leaves science behind to specifically explore the legal and quasi-legal reactions to climate change threat, namely the international and domestic responses to climate change that have evolved thus far and further demonstrates the level of influence they have on energy security in Nigeria. The chapter thus examines global climate change policies under the United Nations Framework Convention on Climate Change ³ (UNFCCC) legal framework, particularly the Kyoto Protocol, ⁴ Bali

³ *United Nations Framework Convention on Climate Change*, 9 May 1992, 1771 UNTS 107, art 1, 31 ILM 849 (entered into force 21 March 1994) [UNFCCC].

Online: http://unfccc.int/essential_background/convention/background/items/1353.php (accessed 10 December 2014).

⁴ UN Doc FCCC/CP/1997/7/Add.1, Dec. 10, 1997; 37 ILM 22 (1998) (entered into force 16 February 2005).

Conference,⁵ Copenhagen Accord,⁶ Cancun Agreements,⁷ Durban Agreements,⁸ Doha Climate Gateway,⁹ and the Lima Accord for Climate Action¹⁰. Because there is not yet express and direct regulatory linkage between climate change risk regulation and energy security regulation (the goal of this study being to identify such linkages) the approach taken is to extrapolate the broad themes of the global climate change regime from international regulatory responses which can then be applied to challenge energy security policy and definitions.

Moreover, the state of the Nigerian domestic legal and policy responses to climate change are also examined with a view to analyzing actual or potential constraints in implementing the main features of such responses - the purpose here being to elucidate and support the view that an integrated approach to climate change and energy security is merited.

A preliminary evaluation of the impacts of the global and national climate change policy regimes on energy security in Nigeria is also undertaken. This is to assist in identifying Nigeria's future potential obligations under the global climate change regime, another important consideration from the energy security perspective. Ultimately, the chapter concludes with the first round of observations regarding the "nexus" between climate change regulation and energy security.

Moreover, it is important to point out that aspects of climate change regulation are often not necessarily perceived as legally binding. Nonetheless, the objective herein is to inform energy security objectives with climate change risk. Furthermore, where climate change regulation is indeed legally binding, (e.g. specifically when domestic legislation has been or is being implemented) an integrated approach to climate change and energy security would compel legal alignment within energy security law and policy itself.

1.2. A Description of Climate Change

⁵ UN Doc FCCC/CP/2007/6/Add.1, Mar. 14 2008.

⁶ UN Doc FCCC/CP/2009/L.7, Dec. 18 2009.

⁷ UN Doc FCCC/CP/2010/7/Add.1, Mar. 15 2011.

⁸ UN Doc FCCC/CP/2011/L. 10, Dec. 10 2011.

⁹ UN Doc FCCC/CP/2012/L. 13, Dec. 7 2012.

¹⁰ UN Doc FCCC/CP/2014/L. 14, Dec. 13 2014.

Climate change is the change in the state of the climate that can be identified (e.g., using statistical tests) by changes in the mean and/or variability of its properties, and that persists for an extended period, typically decades or longer.¹¹ Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use.¹² Article 1 of the UNFCCC defines climate change as: “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods”.¹³

The state of the science of climate change is central to any discussion and assessment of the impacts of climate change on energy security and the global/domestic efforts to address climate change.¹⁴ The work of the Intergovernmental Panel on Climate Change (IPCC) is the nearest the scientific community has come to evolving an extensive consensus on the present position of scientific knowledge on the cause of climate change, its impacts (observed and anticipated), and options for responding to the threats,¹⁵ including appropriate measures for mitigation and adaptation. However, it has been acknowledged that the series of investigations and actions taken by IPCC to arrive at its conclusion has limitations.¹⁶ Nonetheless, the IPCC remains the most tenable and reasonable authority on the science of climate change.¹⁷ The IPCC released its First Assessment Report in 1990 where it was very cautious in concluding that the global climate change has been impacted by human activities. In 1995, the Second Assessment Report was released, and it was the first to declare an evident/manifest impact of human activities on the

¹¹ ML Parry et al., eds., *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, UK: Cambridge University Press, 2007).

¹² *Ibid.*

¹³ *United Nations Framework Convention on Climate Change*, *supra* note 3.

¹⁴ Note that the principal source of information on the science of climate change is the Assessment Reports of the IPCC. For a brief history of the IPCC, see Part B (i) of Chapter One of this thesis.

¹⁵ Meinhard Doelle, *From Hot Air To Action? Climate Change, Compliance and the Future of International Environmental Law* (Toronto: Thomson Carswell Limited, 2005) 30.

¹⁶ The Assessment Reports of the IPCC are not entirely comprehensive and there has been no consensus on the conclusions reached by the IPCC. There are existent and emerging scientific findings that shed new light on our knowledge of the causes of climate change, its impacts and the workable responses and measures. Some scientists have also doubted the level of certainties concerning the variations that have taken place in the climate system, etc. See P Chylek, et al., 1st International Conference on Global Warming and the Next Ice Age, *Conference Proceedings, Halifax, Nova Scotia, Canada, 19-24 August 2001* (Halifax: Dalhousie University, 2001).

¹⁷ It is also the source on which the UNFCCC regime and the parties to it accepted to rely upon in their various activities to tackle climate change.

global climate system.¹⁸ The IPCC also released the Third and Fourth Assessment Reports in 2001 and 2007, respectively.

The main finding of the Working Group I¹⁹ of the 5th Assessment Report²⁰ and the Synthesis Report²¹ of the IPCC is the extreme likelihood that human influence has been the dominant cause of the observed changes in the climate system since the mid-20th century.²² The proposition underlying human-induced climate change is that a number of gases discharged in uncommon quantities into the atmosphere due to human activities trap energy from the sun in the earth's atmosphere, therefore causing an increase in the amount of energy stored in the atmosphere, in the oceans and on the surface.²³ Human influence on the climate is tenable and recent anthropogenic emissions of greenhouse gases are the highest in history.²⁴ The global population and economic growth has been identified as the key drivers of increases in carbon dioxide emissions from fossil fuel combustion leading to atmospheric concentrations of carbon dioxide, methane, and nitrous oxide in an unprecedented manner in the last 800,000 years.²⁵

1.2.A. Observed and Anticipated Impacts of Climate Change Generally

Globally, the impacts of climate change have been observed/noticed since the 1950's. Climate system warming is undeniable, the ocean and atmosphere have warmed. Ocean acidification and reduction in the amounts of snow and ice have altered hydrological systems.²⁶ The extreme sea levels, storm surges, and increasing trends of precipitation indicate serious risks of flooding at

¹⁸ *IPCC Second Assessment Climate Change 1995: A Report of the Intergovernmental Panel on Climate Change* (Cambridge, England: Cambridge University Press, 1996); John T Houghton et al., eds, *Climate Change 1995: The Science of Climate Change: Contribution of Working Group I to the Second Assessment of the Intergovernmental Panel on Climate Change* (Cambridge, England: Cambridge University Press, 1996).

¹⁹ TF Stocker eds., *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, England: Cambridge University Press, 2013).

²⁰ CB Field et al., *Climate Change 2014: Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, England: Cambridge University Press, 2014).

²¹ RK Pachauri et al., *Climate Change 2014: Synthesis Report: A Contribution of Working Groups I, II, III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, England: Cambridge University Press, 2014).

²² WGI AR5 SPM Section D.3, 2.2, 6.3, 10.3-6, 10.9.

²³ RK Pachauri et al., *supra* note 21 at 7, Figure SPM-1.4.

²⁴ *Ibid.*

²⁵ *Ibid* at 4, Figure SPM-1.2, 1.3.1.

²⁶ *Ibid* at 1, Figure SPM 1.1.

regional and national scales.²⁷ Also, in recent decades, changes in the climate system have caused impacts on human and natural systems in every continent and across the oceans.²⁸ It has contributed to the noticed/observed global scale alterations in the frequency and severity of daily temperature extremes. It is very likely that the number of cold days and nights that decreased and the number of warm days and nights that increased on a global scale are due to the impacts of a changing climate.²⁹ There is a very high level of confidence that occurrences, such as heat waves, droughts, cyclones, floods, and wildfires are impacts from recent climate-related extremes and thus disclose unprecedented exposure and susceptibility of many human systems and ecosystems to current variability in the climate system.³⁰ These international, regional and local changes in the climate system are extremely likely to have dominant effects on food production, human security, energy security, availability of renewable resources, climate security/stability, etc.³¹

Sustained emission of greenhouse gases will cause further warming and enduring variations in all basic constituents of the climate system and the deleterious impacts on people and ecosystems will likely be severe, pervasive and irreversible.³² Mounting emissions of greenhouse gases will largely have impacts on global mean surface warming by the 21st century and beyond and these projections vary widely and depend on climate policy and socio-economic development.³³ It is anticipated that the surface temperature will continue to rise and heat waves will occur more often and last longer with more frequency and intensity in extreme precipitation events. The ocean will continue to warm and acidify with rising global mean sea level as a result of projected changes in the climate system.³⁴ Future changes in the climate system will intensify the prevailing risks and engender advanced risks for human and natural systems. However, such risks will not be evenly distributed and the disadvantaged people and communities in countries at

²⁷ CC Ifeanyi-Obi, UR Etuk & O Jike-wai, "Climate Change, Effects and Adaptation Strategies; Implication for Agricultural Extension System in Nigeria" (2012) 2:2 General Journal of Agricultural Sciences 053-060.

²⁸ RK Pachauri et al., *supra* note 21 at 6, Figure SPM 1.3.

²⁹ *Ibid* at 7, Figure SPM 1.4.

³⁰ *Ibid*.

³¹ *Ibid* at 1, Figure SPM-1.

³² Checking climate change would require significant and maintained cuts in greenhouse gas emissions coupled with adaptation to limit the dangerous uncertainties posed by climate change. See *Ibid* at 8, Figure SPM 2.

³³ *Ibid* at 8, Figure SPM 2.1.

³⁴ *Ibid* at 10, Figure SPM 2.2.

all levels of development will most likely experience the worst impacts of a changing climate system.³⁵

Global food security would be gravely undermined due to the projected changes in the climate system by the mid-21st century and beyond, combined with the possibility of 4 degree centigrade increases in global temperature or more above late-20th century levels.³⁶ It is also anticipated that renewable surface water and groundwater resources in most dry subtropical regions will be reduced due to future climate change impacts.³⁷ Climate change will also impact human health by aggravating health challenges that already exist especially in developing countries with low income. It is also anticipated that changes in the climate system will exacerbate the risks for people, assets, and economies. Climate change will also worsen the risks from inland and coastal flooding, landslides, air pollution, drought, etc. The intensity of these risks would be felt by communities lacking in essential infrastructure.³⁸ The IPCC submitted that several aspects of climate change and related impacts will continue for centuries, even if anthropogenic emissions of greenhouse gases are stopped.³⁹

1.2.B. Observed and Anticipated Impacts of Climate Change in Nigeria

There is a huge availability of data on the global and regional impacts of climate change. In Nigeria, for example, climate change researchers have shown that the country is already experiencing various ecological problems caused by a changing climate system.⁴⁰ It is argued that if the current trend is not reversed, Nigeria may face the risk of a temperature increase between 2.5 degree centigrade and 4.5 degree centigrade by the year 2100.⁴¹ There is also a decreasing rainfall in the continental interiors and increasing rainfall in coastal parts of Nigeria due to climate change impacts.⁴² Climate change is responsible for the frequent drought and

³⁵ *Ibid* at 13, Figure SPM 2.3.

³⁶ *Ibid* at 15, Figure SPM 9.

³⁷ *Ibid* at 14, Figure SPM 8.

³⁸ *Ibid* at 16, Figure SPM 2.3.2.

³⁹ *Ibid* at 16, Figure SPM 2.4.

⁴⁰ A Chindo and PN Nyelong, "Lake Chad: From Mega lake to Mini lake" (2004) 6 *Arid Wetland Bulletin* 24-27.

⁴¹ PAO Odjugo, "General Overview of Climate Change Impacts in Nigeria" (2010) 29:1 *Journal of Human Ecology* 47-55.

⁴² PAO Odjugo, "An Analysis of Rainfall Pattern in Nigeria" (2005) 4:2 *Global Journey of Environmental Science* 139-145; PAO Odjugo, "The Impact of Climate Change on Water Resources; Global and Regional Analysis" (2007) 39 *The Indonesian Journal of Geography* 23-41.

desertification in the northern part of Nigeria with serious threats to food security.⁴³ Many rivers have been reported to have dried up in Nigeria, while many rivers in the northern part of the country are at the verge of disappearing.⁴⁴ Climate change impacts will also worsen extreme weather events such as, drought, flood, windstorms, rainstorms, thunderstorms, avalanche, tsunamis, etc.⁴⁵ with adverse effects on human health and security in Nigeria.⁴⁶

1.2.C. Preliminary Comment on Physical Risk Linkages

Energy security refers to a resilient energy system.⁴⁷ This definition of energy security⁴⁸ focuses on the safety and protection of critical energy infrastructure. The Center for a New American Security (CNAS) describes energy security somewhat more expansively as maintaining energy supplies that are environmentally stable, physically secure, and geopolitically reliable.⁴⁹ Accordingly, this section aspires to examine some of the key energy security issues we face today due to the impacts of climate change on energy infrastructure and how climate change threatens our energy systems. In addressing this topic, the connections between energy security and climate change, and their interactions should be carefully identified and examined.

Developing countries like Nigeria are projected to experience serious economic losses as a result of extreme climate occurrences. It is also anticipated that climate change will cause reduction in energy demand for heating with increase in energy demand for cooling in the residential and commercial subdivisions.⁵⁰ Increased frequency and severity of storms, heat waves, and droughts are likely to constitute risks and threats to energy security in various ways.⁵¹ Similarly, energy

⁴³ PAO Odjugo, *supra* note 41 at 50.

⁴⁴ PAO Odjugo, "The Impacts of Global Warming on Climate Change and extreme weather conditions: Global and Regional Evidences" (2007) 7 Asia Pacific Journal on Environment and Development 53-70 at 52.

⁴⁵ PAO Odjugo, *ibid* at 53-70.

⁴⁶ S DeWeerd, "Climate Change coming home: Global warming effect on populations" (2007) 2:3 World Watch 6-13.

⁴⁷ Matthew H Brown, Christie Rewey & Troy Gagliano, *Energy Security* (Washington, DC: National Conference of State Legislatures, 2003) 7.

⁴⁸ Note that energy security will be discussed further in Chapter Three of this thesis.

⁴⁹ See Sharon Burke and Christine Parthemore, *A Strategy for American Power: Energy, Climate and National Security* (Washington, DC: Center for a New American Security, 2008) online: http://www.cnas.org/files/documents/publications/Burke_EnergyClimateNatlSecurity_June08.pdf (accessed 27 March 2016).

⁵⁰ *Ibid*.

⁵¹ Marcus DuBois King and Jay Gullede, "The Climate Change and Energy Security Nexus" (2013) 37:2 The Fletcher Forum of World Affairs 33.

infrastructure in developed countries is vulnerable to distortion and interruption by extreme weather conditions.⁵²

For example, in 2003, a power outage disabled the electricity supply in most of the US northeast occurred on a torrid summer day when the demand for energy was high, damaging an overheated power cable in a small Ohio town. This occurrence interfaced with other power system collapses to cause a devastating power failure which affected about 50 million people in the US and Canada. The US economy lost between \$4 and 10 \$billion as a result of the extreme heat that put pressure on its power system.⁵³ Therefore, increased frequency of extreme heat is likely to place exceptional pressure on aging electrical grids⁵⁴ and energy systems of developing countries with threats to their energy security.

Also, severe weather occurrences can momentarily weaken or damage critical energy infrastructure and the supply of energy. For example, in 2005, the Gulf of Mexico in the United States was hit by Hurricane Katrina, which paralyzed an unusual segment of US oil and gas production and processing capacity with serious consequences for energy security and the economy.⁵⁵

Climate change poses serious risks and threats to the energy security of developing nations that lack “resilience”.⁵⁶ Nigeria, where the evident lack of resilient energy systems⁵⁷ intensifies the level of its energy security risks, is over-dependent on fossil sources for its energy supply. Similarly, the reliance on hydropower for close to a third of electricity generation is normally under pressure as dams dry up, particularly during rainless periods. Extreme weather conditions and accidents linked to climate change are capable of disrupting the Nigerian energy system.

⁵² Center for Naval Analyses, *National Security and the Threat of Climate Change* (Washington DC: CNA Corporation, 2007).

⁵³ *Ibid*; Marcus DuBois King and Jay Gullede, *supra* note 51.

⁵⁴ *Ibid*.

⁵⁵ James Greenleaf et al., *Analysis of Impacts of Climate Change Policies on Energy Security: Ecofys International Final Report* (Brussels: European Commission DG Environment, 2009) at 7.

⁵⁶ Marcus DuBois King and Jay Gullede, *supra* note 51. “Resilience” has been defined as the ability to recover quickly from difficulties; toughness.

⁵⁷ UB Akuru and OI Okoro, “Renewable Energy Investment in Nigeria: A review of the Renewable Energy Master Plan” (2014) 25:3 Journal of Energy in Southern Africa. Online: http://www.scielo.org.za/scielo.php?pid=S1021-447X2014000300008&script=sci_arttext (accessed 15 January 2015).

Academic, defense and intelligence organizations have analyzed climate change as a threat multiplier for strife and insecurity.⁵⁸ Conflict and instability in developing countries can have impact on energy systems in various ways as public institutions lack the capacity to handle or cope with such occurrences.⁵⁹ Climate change can precipitate situations capable of disrupting oil and gas supplies, most likely in African nations.⁶⁰ In Nigeria, organized rebel groups in the Niger-Delta⁶¹ since the 1990s, have responded to political and economic disparities by abducting oil company employees, vandalizing oil infrastructure, engaging in oil bunkering and pirating oil.⁶² The rebellion by the Movement for the Emancipation of the Niger Delta (MEND) and other similar groups may not have an immediate link with climate change; however, it indicates that energy systems can be attractive objects of attack when hostility is provoked.⁶³ Climate change is capable of triggering conflict⁶⁴ that can interrupt energy supply and a nation's energy system. It is pertinent to note that the impacts of a changing climate are more evident in the northern part of Nigeria, where many villages have been abandoned due to desertification.⁶⁵ The consequent population displacement and unconnected growth in population have amplified the prevailing instability.⁶⁶ Boko Haram⁶⁷, a new terrorist, militant and Islamist movement with regional (Al-Qaida in the Islamic Maghreb) and global affiliations, has escalated the prevalence and enormity of this criminal insurgency.⁶⁸ Although Boko Haram's stronghold is considerably far from the

⁵⁸ Marcus DuBois King and Jay Gulledge, *supra* note 51 at 29-30.

⁵⁹ *Ibid.*

⁶⁰ *Ibid.*

⁶¹ Note that majority of Nigeria's oil and gas infrastructure is located in the Niger-Delta, southern Nigeria.

⁶² M Werz and L Conley, "Climate Change Mitigation and Conflict in Northwest Africa: Rising Dangers and Policy Options across the Arc of Tension" (2012) Center for American Progress. Online: http://www.americanprogress.org/issues/2012/04/climate_migration_nwafrica.html (accessed 19 January 2015).

⁶³ Marcus DuBois King and Jay Gulledge, *supra* note 51 at 30.

⁶⁴ Author's Note: The literature assessed and evaluated for the purposes of this paper has not established a compelling case where insecurity and instability in the social systems with immediate links to climate change has disrupted energy supply or destroyed energy infrastructure and energy systems/networks in an extensive manner. See, Philippe Le Billon, *Wars of Plunder: Conflicts, Profits and the Politics of Resources* (London/New York: Hurst/Columbia University Press, 2012); Philippe Le Billon, *Oil* (Cambridge: Polity Press, 2013); Philippe Le Billon, *The Geopolitics of 'Resource Wars'. Resource Dependence, Governance and Violence* (London: Frank Cass, 2005).

⁶⁵ PAO Odjugo and Al Ikhuoria, "The Impact of Climate Change and Anthropogenic Factors on Desertification in the semi-arid Region of Nigeria" (2003) 2:2 Global Journal of Environmental Science 118-126.

⁶⁶ M Werz and L Conley, *supra* note 62.

⁶⁷ Boko Haram group holds itself out to represent the grievances of Northern Nigerians and aims to overthrow the current democratic national government in order to establish an Islamic Caliphate. The group has staged weekly attacks with its members planting explosives in public places in northeastern part of Nigeria. See A Walker, "What is Boko Haram?" (2012) United States Institute of Peace Special Report online: <<https://www.usip.org/sites/default/files/SR308.pdf>> (accessed 28 June 2016).

⁶⁸ Marcus DuBois King and Jay Gulledge, *supra* note 51 at 31.

location of Nigeria's major energy infrastructure, socio-political uprising links with climate change impacts in northern Nigeria have the potential to threaten the nation's resilience and oil producing capacity.

The most compelling linkage established between climate change and energy security is the water-energy connection. Climate change is likely to increase water evaporation, reduce precipitation, and decrease water flows in many regions.⁶⁹ A cardinal unfolding topic for the energy industry is sustaining sufficient water supply in the face of climate change impacts, risks and threats. Globally, the energy industry accounts for eight percent of water withdrawals.⁷⁰ All energy generation technologies⁷¹ need adequate water at some point, and usually in substantial amounts.⁷² Water shortage will reduce hydro-electrical energy generation capacity as nations turn towards this environmentally friendly option to mitigate carbon emissions and diversify their energy generation capacities.⁷³ Decreasing hydropower energy generation capacity can force nations to increase their reliance on the conventional energy generation capacities⁷⁴ that are not climate-friendly. Similarly, scarcity of water limits biofuels and synthetic fuels production which is highly water intensive.⁷⁵

Furthermore, it is expected that increased temperatures, particularly in northern Nigeria will cause increased energy demands in urban areas for cooling purposes. Also, declining rainfall in the northern part of Nigeria will cause reduction in biomass availability for energy generation.

⁶⁹ *Ibid* at 33.

⁷⁰ Nancy E Brune, "Water-Energy-Security Nexus", Presentation delivered in Stockholm, Sweden, (August 2011) online: http://www.worldwaterweek.org/documents/WWW_PDF/2011/Wednesday/T6/The-Water-Energy-Security-Nexus-Implication-for-Urban/The-security-implications-of-water-and-energy.pdf (accessed 27 March 2016).

⁷¹ Fossil fuel electric generation plants and nuclear reactors rely on water for functions, such as, disposal of waste, cooling, and steam generation. Also, the Carbon Capture and Storage (CCS) technologies can be used to mitigate coal-fired power plants emissions, however such adjustments would double their water utilization. See Atlantic Council, *Energy for Water and Water for Energy* (2011) online: <http://www.cus.org/publication/energy-water-and-water-energy> (accessed 22 January 2015).

⁷² *Ibid* at 34.

⁷³ Marcus DuBois King and Jay Gulledge, *supra* note 51 at 34.

⁷⁴ For example, oil-fired power stations, gas-fired power plants, heavily-polluting coal-fired power plants, etc.

⁷⁵ Center for Naval Analysis, "Ensuring America's Freedom of Movement: A National Security Imperative to Reduce U.S. Oil Independence" (2011) CNA Corporation online: <http://www.cna.org/EnsuringFreedomofMovement>. Note that net withdrawal of water for energy generation and production purposes competes with human consumption and agricultural uses. See D Stover, "In Hot Water: The "Other" Global Warming" Bulletin of the Atomic Scientists (15 February 2012) online: <http://www.thebulletin.org/web-edition/columnists/dawn-stover/hot-water-the-other-global-warming> (accessed 22 January 2015).

Increased intensity and frequency of storm surges and rising sea levels can lead to the widespread devastation of critical energy infrastructure off the coast of Nigeria.⁷⁶ It is projected that increased rainfall intensity in the coastal zones of southern Nigeria may lead to system disruptions, interruptions in the distribution of electricity, and widespread destruction of power-lines as a result of severe erosion.⁷⁷

Marcus DuBois King and Jay Gulledge found an example where climate change has direct positive impacts on energy security. Climate change is fast increasing the melting of the Arctic ice sheet and this is projected to create wealth by generating new oil supplies as the melting ice sheet enables the exploitation of seabed oil, gas and other available energy resources.⁷⁸

1.3 International Regulatory Responses to Climate Change

1.3.A. The International Panel on Climate Change (IPCC)

The IPCC is a scientific intergovernmental organization under the auspices of the UN charged with analyzing and assessing the causes and risks of climate change. The Panel was founded in 1988 by the United Nations Environmental Programme (UNEP) and the World Meteorological Organization (WMO).⁷⁹ The IPCC produces reports⁸⁰ to support the objective/goal of the UNFCCC.⁸¹ The Panel's reports incorporate the technical, scientific, economic and social information material to the comprehension and recognition of the scientific basis of risk of

⁷⁶ *Ibid.*

⁷⁷ *Ibid.*

⁷⁸ There are also geo-political consequences that will follow this development, including the remilitarization of the Arctic region by states that are jostling for the control and exploitation of the energy resources in the Arctic. See Marcus DuBois King and Jay Gulledge, *supra* note 51 at 34. For further discussion, see R Huebert et al, *Climate Change and International Security: The Arctic as a Bellwether* (Arlington, Virginia: Center for Climate and Energy Solutions, 2012).

⁷⁹ The IPCC was later endorsed by the United Nations General Assembly (UNGA) through Resolution 43/53. Membership of the IPCC is open to all members of the WMO and UNEP. See Shardul Agrawala, "Context and Early Origins of the Intergovernmental Panel on Climate Change" (1998) 39:4 *Climate Change* 605-620.

⁸⁰ Note that the IPCC has produced five assessment reports since it was established and the Fifth Assessment Report was finalized in 2014. It is anticipated that the Fifth Assessment Report will pave the way for an international, legally binding treaty on reducing carbon emissions at the UN Climate Change Conference in Paris, 2015.

⁸¹ Shardul Agrawala, *supra* note 79.

human-induced climate change, its future effects and options for mitigation and adaptation.⁸² IPCC's reports include a "Summary for Policymakers" which is subject to complete endorsement by delegates from every participating government.⁸³ The Panel issues a globally accepted authority on climate change by furnishing reports which bear the consent of foremost climate scientists and the consensus of participating governments.⁸⁴

1.3.B. United Nations Framework Convention on Climate Change (UNFCCC)⁸⁵

Attempts at containing the threats of climate change by the international community started with the Stockholm Conference (1972) which led to creation of the United Nations Environmental Programme (UNEP).⁸⁶ On 9 May 1992, the UNFCCC was adopted by consensus in New York. It was signed by 166 countries at the Rio Summit in June and entered into force on 21 March 1994.⁸⁷ The UNFCCC is a global environmental treaty and currently the only international climate policy with broad legitimacy, due in part to its virtually universal membership.⁸⁸ Article 2 of the UNFCCC states the ultimate objective of the climate change treaty as follows:

“...stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner”.⁸⁹

⁸² Eleftheria Vasileiadou, Gaston Heimeriks & Arthur Peterson, “Exploring the Impact of the IPCC Assessment Reports on Science” (2011) 14:8 Environmental Science and Policy 1052.

⁸³ Rik Leemans, “Personal Experiences with the Governance of the policy-relevant IPCC and Millennium Ecosystem Assessments” (2008) 18:1 Global Environmental Change 12.

⁸⁴ Andreas Bjurstrom and Merritt Polk, “Climate Change and Interdisciplinarity: a Co-citation Analysis of IPCC Third Assessment Report” (2011) 87:3 Scientometrics 525.

⁸⁵ United Nations Framework Convention on Climate Change, 9 May 1992, 1771 UNTS 107, art 1, 31 ILM 849 (entered into force 21 March 1994) [UNFCCC].

⁸⁶ OF Oluduro, “Climate Change – A Global and National Perspective: The Case of Nigeria” (2012) 5:3 Journal of Politics and Law 33.

⁸⁷ Liz Bossley, *Climate Change and Emissions Trading: What Every Business Needs to Know*, 2d ed. (London: Consilience Energy Advisory Group Limited, 2005).

⁸⁸ Donald Feaver and Nicola Durrant, “A Regulatory Analysis of International Climate Change Regulation” (2008) 30:4 Law and Policy 394-422.

⁸⁹ UNFCCC, Art. 2, Text of the UNFCCC, Available at http://unfccc.int/essential_background/convention/background/items/1353.php (accessed 11 December 2014).

The ultimate goal is then fine-tuned in Article 3 through the principles of equity for present and future generations, and a precautionary approach with common but differentiated responsibilities. The UNFCCC identified the various capacities and contributions of the developed and developing countries towards the mitigation of climate change. Therefore, Annex 1 Parties⁹⁰ were charged with a huge responsibility to shoulder the task of mitigating the impacts of climate change. The UNFCCC did not stipulate what the level of “dangerous anthropogenic interference” would be.⁹¹ The parties to the UNFCCC are required to implement regional and national programs toward alleviating the effects of climate change.⁹²

The treaty did not prescribe mandatory limits of greenhouse gas (GHGs) emissions; therefore there was no proviso to enforce the limits. Further, the UNFCCC only recommended that the developed countries (Annex 1 Parties) should reduce their GHGs to 1990 levels⁹³; it did not mandate any emissions cut. The assessment indicated that the Annex 1 Parties were responsible to take the lead in GHG emissions reduction.

However, developing countries like Nigeria (Non-Annex 1 Parties)⁹⁴ were not specifically directed to reduce their GHG emissions. Nevertheless, all the Parties⁹⁵ to the UNFCCC were obligated to satisfy mandatory commitments to report on their national inventory of anthropogenic emissions and actions taken to implement the UNFCCC.⁹⁶ In 1995, the Parties to the UNFCCC met in Berlin to adopt the Berlin Mandate. The Parties affirmed in the Berlin Mandate⁹⁷ that more measures needed to be taken to tackle climate change, with Annex 1 Parties

⁹⁰ Within the framework of the Treaty, Annex 1 Parties are developed countries and countries with economies in transition.

⁹¹ Anita M Halvorsen, “UNFCCC, The Kyoto Protocol, and the WTO-Brewing Conflict or are they mutually Supportive” (2007-2008) 36 Denv. J. Int’l L. & Pol’y 369.

⁹² Article 4(1) (b) http://unfccc.int/essential_background/convention/background/items/1353.php (accessed 11 December 2014).

⁹³ UNFCCC, Art. 4(2) (b) Text of the UNFCCC, Available at http://unfccc.int/essential_background/convention/background/items/1353.php (accessed 11 December 2014)

⁹⁴ Note that Nigeria is a developing country; therefore it is one of the Non-Annex 1 Parties within the framework of the Treaty.

⁹⁵ Both Annex 1 and Non-Annex 1 Parties within the framework of the Treaty.

⁹⁶ Article 4(1) (a) http://unfccc.int/essential_background/convention/background/items/1353.php (accessed 11 December 2014).

⁹⁷ Conference of the Parties to the Framework Convention on Climate Change, March 28-April 7, 1995, *Report of the Conference of the Parties*, 1/CP.1, U.N. Doc. FCCC/CP/1995/7/Add.1 (June 6, 1995). The Conference also endorsed the concept of a pilot phase for joint implementation activities. Some degree of co-operation had been envisaged by the 1992 Convention itself which in Article 4(2) (b) talks of the aims of ‘returning [GHG emissions]

taking the lead. These efforts, and the need for enforcement of the GHG emissions limits, led to adoption of the Kyoto Protocol in 1997.

1.3.C. Kyoto Protocol to the Framework Convention on Climate Change, 1997⁹⁸

Since 1997, the Kyoto Protocol has become the nucleus of the global climate change regime. More than ten years of climate policy negotiations have produced the Kyoto Protocol, the first legally binding international agreement on climate protection.⁹⁹ The Kyoto Protocol sets the framework for acceptance of legally binding targets.¹⁰⁰ It also included specific emission reduction targets for each state, listed in Annex 1 of the UNFCCC.¹⁰¹ The Kyoto Protocol commits industrialized countries to obligatory rules aimed at attaining the objectives of the convention between 2008 and 2012. Nigeria ratified the Kyoto Protocol 10 December 2004 and it came into force on 10 March 2005.¹⁰² 176 states have by one way or the other accepted the Kyoto Protocol, constituting 61.6% of total emissions. The legally binding emissions reductions target was a five-year target with standard yearly emissions connected to emissions in 1990. Collectively, each Annex 1 Party specific targets, if met, are anticipated to culminate in mitigation of emissions in industrialized countries of around 5.2% below 1990 levels.

Further, the Protocol created three potent mechanisms in which state parties could reduce costs improving parties' capacity to meet the emission targets assigned to them. These mechanisms are the Clean Development Mechanism (CDM), Joint Implementation (JI), and Emissions Trading

individually, *or jointly*, to their 1990 levels ... This pilot phase was to be called 'activities implemented jointly (AIJ) under the pilot phase'. The objective was to allow investments by Annex I countries in a range of GHG mitigation projects outside their own borders to allow them to begin to understand more clearly the implications of developing such 'off shore' projects. The decision did not envisage Annex I Parties being able to claim credit against future reduction targets for investments made under this AIJ pilot phase.

⁹⁸ UN Doc FCCC/CP/1997/7/Add.1, Dec. 10, 1997; 37 ILM 22 (1998) (entered into force 16 February 2005)

⁹⁹ Christoph Bohringer, "The Kyoto Protocol: A Review and Perspectives", Climate Policy Network Discussion Paper No. 04-01 online: <<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.203.3804&rep=rep1&type=pdf>> (accessed 28 June 2016).

¹⁰⁰ M Grubb, C Vrolijk & D Brack, *The Kyoto Protocol: A Guide and Assessment* (London: Royal Institute of International Affairs and Earthscan Publications, 1999) (London: Earth Scan, 1999).

¹⁰¹ Kyoto Protocol, note 1, Annex B.

¹⁰² Kyoto Protocol, Status of Ratification at http://unfccc.int/essential_background/kyoto_protocol/status_of_ratification/items/2613.php (accessed 11 December 2014).

(ET).¹⁰³ These “flexibility mechanisms” are available to Annex 1 Parties as alternatives supplementary to domestic efforts with cutbacks/reductions outside their own territories. Four years passed from the signing of the Kyoto Protocol to the Marrakesh Accords.¹⁰⁴ The Marrakesh Accords also led to the establishment and operation of two new funds relating to the UNFCCC; that is, the Special Climate Change Fund¹⁰⁵ and the Least Developed Countries Fund.¹⁰⁶ Descriptions of the flexibility mechanisms are as follows:

The Clean Development Mechanism (CDM): The CDM¹⁰⁷ enables Annex 1 Parties or private bodies in the industrialized countries to embark on projects that reduce GHG emissions in the territories of Non-Annex 1 Parties in return for credits they can apply toward their own emission pacts under the Kyoto Protocol.¹⁰⁸ This was an eleventh-hour incorporation into the Kyoto Protocol.¹⁰⁹ The basic notion behind CDM was that the developed states (Annex 1 Parties) would provide developing states (Non-Annex 1 Parties) with the much needed development assistance projects in the form of technology transfer and promotion of economic activities. The Annex 1 Parties are issued with Certified Emission Reductions (CERs) as soon as the project is

¹⁰³ For an extensive discussion of the issues related to the 3 mechanisms, see, Sophia Tsai, “UNFCCC Technical Workshop on Mechanisms of the Kyoto Protocol” (1999) 10 Colo. J. Int’l Envtl. L. & Pol’y 220.

¹⁰⁴ Seventh Session of the Conference of the Parties at which procedures and modalities for Emissions Trading, Joint Implementation, and Clean Development Mechanism were set and defined in accordance with the provisions of the Kyoto Protocol: 29 October-9 November, 2001, Marrakesh, Morocco. The Marrakesh Accords also establishes a framework for capacity building, for implementation of the UNFCCC, and to stimulate effective participation in the Kyoto Protocol. The framework must reflect the host countries’ national sustainable development strategies, and special needs of the Least Developed Countries. Developing countries have the responsibility to identify their specific needs and to co-operate with other developing countries (south-south co-operation). Annex II parties have the responsibility to co-ordinate the efforts to build this capacity building framework. And the framework shall be reviewed at every COP session. Further, the Marrakesh Accords provides for the following: Capacity-building in countries with economies in transition; Development and transfer of technologies; Additional guidance to the operation of the financial mechanism; Funding under the Convention; Funding under the Kyoto Protocol; Forest management activities; Administrative matters; etc. For further discussion of the issues raised in the Marrakesh Accords, see generally, Christian Vrolijk, “The Marrakesh Accords: A Brief Point-by-Point Description and Comments” (2002); www.riia.org/Research/eep/climate.html (accessed 13 December 2014).

¹⁰⁵ Christian Vrolijk, “The Marrakesh Accords: A New Interpretation of the Kyoto Protocol: Outcomes from the Hague, Bonn and Marrakesh” (2002) The Royal Institute of International Affairs: Sustainable Development Programme.

¹⁰⁶ *Ibid.*

¹⁰⁷ Note that the CDM mechanism also applies to a developing state like Nigeria that is at a stage in its development and growth where its energy needs are likely to increase remarkably in the years to come.

¹⁰⁸ Kyoto Protocol, note 20, Article 12.

¹⁰⁹ See Jacob Wertsman, “The Clean Development Mechanism; Unwrapping the ‘Kyoto Surprise’” (1998) 7 Rev. Eur. Community & Int’l Envtl. L. 147.

endorsed.¹¹⁰ Therefore, the emission reductions achieved would count toward the assigned target of the developed state. In turn, the Annex 1 state provides assistance to the developing country to achieve reductions that would otherwise not have been realized.¹¹¹ Over the passage of years, however, it became obvious that this concept would pose serious challenge in practice.¹¹² 2% of the proceeds from the CDM projects are charged into assisting developing countries most vulnerable to climate change to meet adaptation costs.¹¹³ The CDM projects are also required to stimulate sustainable development in the developing state; that is, the Non-Annex 1 Party which is the host state. This mechanism promotes Foreign Direct Investment in the host states. Further, CDM projects are to be supplemental to emission reductions measures taken domestically in Annex 1 Party states.¹¹⁴

Joint Implementation (JI): Joint Implementation has been described as a fusion of Clean Development Mechanism (CDM) and Emissions Trading (ET).¹¹⁵ This mechanism comprises two courses: one is similar to ET and the other, which is project-based, mirrors the CDM.¹¹⁶ The mechanism JI is designed to permit Annex 1 Parties to earn credits in form of Emission Reductions Units (ERUs) which they can use in regard to their own emission reduction targets by executing projects in the territory of another Annex 1 Party that reduce emissions or increase removals by sinks.¹¹⁷ Article 6 of the Kyoto Protocol builds directly on the expression of Article 4(2) (b) of the UNFCCC which contemplates that states listed in Annex 1 may act individually or jointly to meet their emission reduction goals and objectives.¹¹⁸ The majority of the projects under the JI mechanism applies to states with economies in transition that are on the verge of rebuilding their economies.

Emissions Trading (ET): This mechanism anticipated by the Kyoto Protocol permits the trading of portions of Assigned Amounts Units of emissions among Annex 1 Parties in accordance with

¹¹⁰ Kyoto Protocol, Article 12(3) (a).

¹¹¹ Meinhard Doelle, *supra* note 15 at 30.

¹¹² *Ibid.*

¹¹³ Kyoto Protocol, Article 12 (8).

¹¹⁴ Anita M Halvorssen, *supra* note 91 at 374.

¹¹⁵ Meinhard Doelle, *supra* note 15 at 35.

¹¹⁶ *Ibid.*

¹¹⁷ See Article 6(1) of the Kyoto Protocol.

¹¹⁸ David Freestone, "The International Climate Change Legal and Institutional Framework: An Overview" in David Freestone and Charlotte Streck, eds, *Legal Aspects of Carbon Trading: Kyoto, Copenhagen, and beyond* (Oxford: Oxford University Press, 2009) 4.

Article 17 of the Protocol. It involves the exchange of credits between Annex 1 Parties. Currently, every entity, “whether a state or not, whether a Party to the Kyoto Protocol or not, can trade Kyoto emission rights. But if such trade leads to a transfer, such transfer can, as a general rule, only be validated by Parties to the Protocol”.¹¹⁹ This mechanism allows Annex 1 Parties to sell units they do not require for compliance with their assigned emissions targets on the condition that they are able to cut their emissions below the commitment level. International emission trading is supplementary to the domestic measures of the Annex 1 Parties. It is pertinent to note that the European Union launched the European Union Trading Scheme¹²⁰ (ETS) on January 1, 2005.¹²¹

1.3.D. The 2007 United Nations Climate Change Conference¹²²

The 2007 Conference took place in Bali, Indonesia, between 3 and 5 December 2007.¹²³ Governments adopted the Bali Road Map¹²⁴ which included the Bali Action Plan. Governments, through the Action Plan, launched a “new, comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012”.¹²⁵ This Action Plan included a guideline which aimed to develop by 2009 a legal instrument to replace the 1997 Kyoto Protocol when it expired in 2012.¹²⁶ The governments present at the Bali Conference divided the Action Plan into five (5) major

¹¹⁹ See Sander Simonetti and Rutger de Witt Wijnen, “International Emissions Trading and Green Investment Schemes” in David Freestone and Charlotte Streck, eds, *Legal Aspects of Carbon Trading: Kyoto, Copenhagen, and beyond* (Oxford: Oxford University Press, 2009).

¹²⁰ The ETS is the first global emissions trading mechanism.

¹²¹ A Ellerman, Denny Buchner & K Barbara, “The European Union Emissions Trading Scheme: Origins, Allocation, and Early Results” (2007) 1:1 Rev of Environmental Economics and Pol’y 66-87.

¹²² The 13th Session of the Conference of the Parties to the UNFCCC and the 3rd Session of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol took place in Bali. Also sitting were the 27th Sessions of the Subsidiary Body for Implementation (SBI) and the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the resumed 4th Session of the Ad hoc Working Group on Further Commitments for Annex 1 Parties under the Kyoto Protocol; UN Doc FCCC/CP/2007/6/Add.1, Mar. 14 2008.

¹²³ http://unfccc.int/meetings/cop_13/items/4049.php, (accessed 13 December 2014).

¹²⁴ The roadmap is of particular relevance in that the UNFCCC Parties agreed to consider ‘measurable, reportable, and verifiable nationally appropriate mitigation actions’ for all parties (including developing countries), although developed countries also agree to consider ‘commitments...including quantified emission limitation and reduction goals. Bali is potentially wider because its Roadmap includes: “mitigating climate change by cutting emissions; facilitating clean technology transfer; adapting to such climate change consequences; financing adaptation and mitigation measures”. See generally, Elizabeth Burleson, “The Bali Climate Change Conference” (2008) 12:4 American Society of International Law.

¹²⁵ *Ibid.*

¹²⁶ David Freestone, *supra* note 118 at 10.

groupings: shared vision; adaptation; mitigation; technology and financing. Also, decisions with regard to technology for developing countries; deforestation and forest management; establishment of the Adaptation Fund Board¹²⁷; were made at the Conference. Bali signaled real progress and revealed the urgency of the need to intensify the fight against climate change.

1.3.E. The Copenhagen Accord¹²⁸

The Copenhagen Accord was the major political outcome of the Copenhagen Summit. However, the Accord could not provide a reasonable framework on which to build more ambitious global action because it could not translate into a framework for a legally binding pact.¹²⁹ Under the Accord, both developed and developing states¹³⁰ agreed for the first time to reduce their emissions and to register their national commitments by the end of January 2010.¹³¹ Also, small island developing states and some least developed states confronted all the large emitters to intensify their efforts in reducing global emissions and in tackling climate change.¹³²

According to the Pew Center on Global Climate Change, key elements of the Copenhagen Accord include:

...goal of limiting global temperature increase to 2 degrees Celsius; a process for countries to enter their specific mitigation pledges by January 31, 2010; broad terms for the reporting and verification of countries' actions; a collective commitment by developed countries for \$30 billion in "new and additional" resources in 2010-2012 to help developing countries reduce emissions, preserve forests, and adapt to climate change; and a goal of mobilizing \$100 billion a year in public and private finance

¹²⁷ Benito Muller, "Bali 2007: On the road again!" (2008) Oxford Institute for Energy Studies online: <http://www.oxfordclimatepolicy.org/publications/documents/comment_0208-2.pdf> (accessed 29 June 2016) 1 and 2.

¹²⁸ 15th session of the Conference of the Parties to the UNFCCC and 5th session of the Meeting of the Parties to the Kyoto Protocol, December 7 to 18, 2009, Copenhagen, Denmark; UN Doc FCCC/CP/2009/L.7, Dec. 18 2009.

¹²⁹ Erwin Jackson and Will McGoldrick, "Global climate policy post-Copenhagen: Progress and Prospects" (2010) The Climate Institute online: <www.climateinstitute.org.au> (accessed 14 December 2014).

¹³⁰ Major emerging economies like China, India, South Korea, Brazil, Indonesia, South Africa, and Mexico also agreed to economy wide targets to reduce or slow emission growth in greenhouse pollution. This is the most significant achievement in Copenhagen.

¹³¹ National Resources Defense Council, "From Copenhagen Accord to Climate Action: Tracking National Commitments to Curb Global Warming" (2010) Natural Resources Defense Council online: <<https://www.nrdc.org/sites/default/files/Copenhagen%20accord.pdf>> (accessed 29 June 2016).

¹³² *Ibid.*

by 2020 to address developing countries' needs. The Accord also calls for the establishment of a Copenhagen Green Climate Fund, a High Level Panel to examine ways of meeting the 2020 finance goal, a new Technology Mechanism, and a Mechanism to channel incentives for reduced deforestation.¹³³

These elements represented important steps on a new pathway to real progress in reducing emissions and moving to a low-carbon global economy. However, the Copenhagen Accord is not a legally binding treaty; it is just a political accord¹³⁴ reached by some world leaders.

1.3.F. The Cancun Agreements¹³⁵

In order to scale up the provision of long term financing for developing countries, Governments at COP 16 in Cancun decided to establish a Green Climate Fund.¹³⁶ In Cancun, the Conference of Parties made remarkable achievements by reaching new agreements on, among other things: the Green Climate Fund; Clean Development Mechanism (CDM); the Cancun Adaptation Framework (CAF); the Technology Mechanism; national commitments covering 80% of global emissions; and improved transparency, review and verification.¹³⁷

¹³³ Elliot Diringer, "Summary of COP 15 and CMP 5" (2009) Pew Center on Global Climate Change online: <<http://www.c2es.org/docUploads/copenhagen-cop15-summary.pdf>> (accessed 14 December 2014).

¹³⁴ The UNDP's analysis concluded with similar verdicts: "The Copenhagen conference fell short of a comprehensive agreement on a future framework on climate change. It did however make progress both in terms of identifying the key points of a potential political consensus on the fundamental issues for the future agreement through the Copenhagen Accord and in terms of clarifying further important technical points related to the implementation of the enhanced action on mitigation, adaptation, technology and finance... These achievements provide a good basis for advancing the negotiations under the UNFCCC..." A. Averchenkova, "The Outcomes of Copenhagen: The Negotiations and The Accord" (2010) UNDP Environment and Energy Group, Climate Policy Series online: <<http://www.undpcc.org/documents/p/1376.aspx>> (accessed 14 December 2014).

¹³⁵ UN Doc FCCC/CP/2010/7/Add.1, Mar. 15 2011.

¹³⁶ "The fund will support projects, programmes, policies and other activities in developing country Parties using thematic funding windows. A Transitional Committee selected by Parties to the UNFCCC will design the details of the new fund, which will be designated as an operating entity of the financial mechanism of the Convention and will be accountable to the COP". See, The Cancun Agreements UNFCCC COP 16/ CMP 6, 16th session of the Conference of the Parties to the UNFCCC and the 6th session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol.

¹³⁷ See, SA Mason-Case, "The Cancun Agreements and Legal Preparedness for Climate Change in Developing Countries" (2011) International Development Law Organization and the Centre for International Sustainable Development Law (CISDL) online: <http://cisdl.org/public/docs/legal/Mason%20Case%20Sarah_The%20Cancun%20Agreements%20and%20Legal%20Preparedness%20for%20Climate%20Change%20in%20Developing%20Countries.pdf> (accessed 29 June 2016).

1.3.G. The Durban Agreements¹³⁸

In Durban¹³⁹, in late 2011, the Conference of Parties delivered a breakthrough on the response of the global community to climate change. In the meeting, the negotiations progressed, in a balanced fashion, and the Parties decided that the Bali Action Plan and Cancun Agreements should be implemented with the UNFCCC and the Kyoto Protocol.¹⁴⁰ The outcomes included a decision by Parties to adopt a universal legal agreement on climate change as soon as possible, and no later than 2015.¹⁴¹ The Conference also launched the Durban Platform for Enhanced Action to strengthen “the multilateral, rules-based regime under the Convention” and negotiations aimed at developing a protocol with a legal force from 2020 and on.¹⁴²

1.3.H. The Doha Climate Gateway¹⁴³

Negotiations under the UNFCCC and the Kyoto Protocol were held in Doha, Qatar, in December 2012.¹⁴⁴ The most significant achievement of the Conference was the adoption of an amendment to the Kyoto Protocol for the establishment of a second round of binding GHG targets for Europe, Australia, and other developed countries. Parties also took eventual decisions under a negotiating track launched in Bali (2007). These negotiations produced new mechanisms on finance, adaptation, review, voluntary national pledges by 94 countries to cut their emissions,

¹³⁸ UN Doc FCCC/CP/2011/L. 10, Dec. 10 2011.

¹³⁹ The Conference involved a series of events, including the 17th session of the COP to the UNFCCC and the 7th meeting of the COP serving as the Meeting of Parties to the Kyoto Protocol. See, Fiona Harvey and John Vidal, “Durban deal will not avert catastrophic climate change, say scientists” *The Guardian* (11 December 2011) *The Guardian* online: <<https://www.theguardian.com/environment/2011/dec/11/durban-climate-change-deal>> (accessed 29 June 2016).

¹⁴⁰ Daniel Bodansky, “The Durban Platform: Issues and Options for a 2015 Agreement” (2012) Center for Climate and Energy Solutions online: <<http://www.c2es.org/docUploads/durban-platform-issues-and-options.pdf>> (accessed 29 June 2016).

¹⁴¹ *Ibid.*

¹⁴² Establishment of an Ad Hoc Working Group on the Durban Platform for Enhanced Action, UNFCCC Decision 1/CP. 17, Dec. 11, 2011, UN Doc. FCCC/CP/2011/9/Add.1. See generally, L Rajamani, “The Durban Platform for enhanced action and the future of the climate regime” (2012) 61:2 *International Comparative Law Quarterly*.

¹⁴³ UN Doc FCCC/CP/2012/L. 13, Dec. 7 2012.

¹⁴⁴ See UNFCCC and Kyoto Protocol decisions adopted in Doha (2012) online: <http://unfccc.int/meetings/doha_nov_2012/meeting/6815/php/views/decisions.php> (accessed 14 December 2014) The UNFCCC decisions were adopted by the 18th Conference of the Parties (COP) while the Kyoto Protocol decisions were adopted by the 8th session of the COP serving meeting of the Parties to the Kyoto Protocol.

technology, as well as the conclusion of a negotiation begun in Montreal (2005).¹⁴⁵ The Doha Gateway also focused on, *inter alia*: approaches to address loss and damage; Clean Development Mechanism (CDM); encouragement of public participation in the context of UNFCCC Article 6;¹⁴⁶ raising ambitions for mitigation actions; and support.¹⁴⁷

1.3.I. Lima Accord for Climate Action¹⁴⁸

Before the Lima Accord for Climate Action (2014), there was the Warsaw Outcomes¹⁴⁹ (2013) where governments took essential decisions to stay on track towards achieving a legally binding global climate change agreement in 2015.¹⁵⁰ The 20th session of the Conference of the Parties and the 10th session of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol took place from 1 to 12 December 2014 (COP 20/CMP 10) in Lima, Peru.¹⁵¹ The agreement removed the longstanding division of the world into developed and developing countries and paved way for a model of unity.¹⁵²

¹⁴⁵ See, UNFCCC COP Decisions 1/CP.18 (Agreed Outcome Pursuant to the Bali Action Plan) and 2/CP.18 (Advancing the Durban Platform), and Kyoto Protocol CMP Decision 1/CMP.8 (Amendment to the Kyoto Protocol).

¹⁴⁶ *Ibid.*

¹⁴⁷ See generally, World Bank Report, "Turn down the Heat: Why a 4 Degree Centigrade World Must be Avoided" (2012) World Bank online: <climatechange.worldbank.org/sites/default/files/Turn_Down_the_heat_Why_a_4_degree_centigrade_warmer_world_must_be_avoided.pdf> (accessed 15 December 2014).

¹⁴⁸ UN Doc FCCC/CP/2014/L. 14, Dec. 13 2014. COP 20: UN Climate Change Conference, Lima 2014.

¹⁴⁹ An overview of key outcomes that governments agreed in Warsaw include, *inter alia*: Closing of the pre-2020 ambition gap; the urgency to support peoples affected by climate change impacts; strengthening the efforts to mobilize \$100 billion by 2020; progress on driving adaptation; technology to boost action on climate change; as well as progress towards accountability. See generally, Lina Li et al., "Warsaw Outcomes, and Implications for LDCs" (2014) European Capacity Building Initiative Publications and Policy Analysis Unit for the LDC Group online: <<https://ldclimate.files.wordpress.com/2014/04/warsaw-outcomes.pdf>> (accessed 29 June 2016).

¹⁵⁰ Note that the objective of the 2015 agreement can be divided into 2 major categories: First, to bind nations together into an effective global effort to reduce emissions rapidly enough to chart humanity's longer term-path out of the danger zone of climate change, while building adaptation capacity; second, to stimulate faster and broader action now. See, Jin-Young Moon and Sung Hee Lee, "Warsaw COP 19 Outcomes and Implications of Climate Finance" (2014) Korean Institute for International Economic Policy online: <<http://ssrn.com/abstract=2487655> or <http://dx.doi.org/10.2139/ssrn.2487655>> (accessed 15 December 2014).

¹⁵¹ Michael Jacobs, "Lima deal represents a fundamental change in global climate change regime" The Guardian (15 December 2014) online: <<http://www.theguardian.com/environment/2014/dec/15/lima-deal-represents-a-fundamental-change-in-global-climate-regime>> (accessed 15 December 2014).

¹⁵² *Ibid.*

The Lima Conference achieved two goals. The first was to reach an agreement on an outline text of the 2015 Paris Accord/Alliance¹⁵³. The second goal was to accept the rules under which countries must bring forward their national commitments (intended nationally determined contributions) to the Paris Summit in 2015.¹⁵⁴ The COP reached consensus on, among other things: Donations to a Green Climate Fund (\$100 billion) in climate aid for developing countries; elements of a long term deal with a wide range of options; as well as compensation for loss and damage suffered by vulnerable countries.¹⁵⁵

1.3.J. Summary of International Responses

1.3.J.i. Broad Themes

Theme One: Mitigation

Based on the preceding overview, it is easily observed that the primary focus of the global community with respect to climate change is on mitigation measures to reduce emissions and increase the sinks of greenhouse gases to prevent catastrophic climate change impacts.¹⁵⁶

The Kyoto Protocol of the UNFCCC is the most significant global climate change response in this regard, but is widely regarded as a failure. It prescribed a 5.2% joint and multilateral reduction of greenhouse gas emission among industrialized countries in contrast to 1990 levels. This 5.2% prescription has been described as too low to make a significant difference.¹⁵⁷ The Kyoto Protocol of the UNFCCC expired in 2012 and the UNFCCC member states have

¹⁵³ The modest agreement made in the Lima Conference would form the building blocks of the deal to be signed in Paris 2015. Discussed further in the Addendum to this paper at Chapter Six.

¹⁵⁴ Jennifer Duggan, "China climate negotiator says Lima deal 'balanced'" The Guardian (15 December 2014) The Guardian online: <<http://www.theguardian.com/environment/chinas-choice/2014/dec/16/china-climate-negotiator-says-lima-deal-balanced>> (accessed 15 December 2014).

¹⁵⁵ Suzanne Goldenberg, "Lima climate change talks end in agreement - but who won?" The Guardian (14 December 2014) The Guardian online: <<http://www.theguardian.com/environment/2014/dec/14/lima-climate-change-talks-who-won>> (accessed 16 December 2014).

¹⁵⁶ See Lindsay F Wiley and Lawrence O Gostin, "The International Response to Climate Change: An Agenda for Global Health" (2009) Georgetown Law Faculty Publications online: <<http://scholarship.law.georgetown.edu/facpub/16>> (accessed 30 March 2016).

¹⁵⁷ *Ibid.* Note that the treaty exempted heavily populated states like China and India; and the United States refused to ratify it.

negotiated a number of greenhouse gas emission reduction regimes¹⁵⁸ Similarly, the subsequent negotiated ambitious targets are not going to be adequate to prevent the intense impacts of climate change on energy security, with the most vulnerable populations of the world's developing countries exposed to the overwhelming burden of the risks and threats that a changing climate poses to energy security and human/natural systems.

Theme Two: State Agreements to Cooperate

The UNFCCC member states have made efforts to reach several agreements and devise measures towards climate change mitigation and adaptation.

Also, the impact of past and present-time emissions is expected to be extremely significant to the extent that it is urgently required to simultaneously decrease global greenhouse gas emissions and prepare for the consequences of a changing climate system. Therefore, to facilitate the 5.2% emissions reduction target, the Protocol designed three “flexibility mechanisms” through which Annex 1 Parties can meet the emission targets assigned to them. These mechanisms, as earlier described, are the Clean Development Mechanism (CDM), Joint Implementation (JI), and Emissions Trading (ET).¹⁵⁹ Further, in the climate summits held between 2007 and 2014, member states launched various action plans on adaptation, mitigation, technology and financing in order to tackle the global climate change problem with special focus on the most vulnerable populations of the developing countries. Climate funds,¹⁶⁰ such as the Green Climate Fund (\$100 billion), Special Climate Change Trust Fund, Adaptation Trust Fund and Least Developed Countries Fund were inaugurated to assist the developing economies in mitigating and adapting to the impacts of climate change.

Theme 3: Integration and Uniformity

¹⁵⁸ The member states of the UNFCCC also held climate summits in Bali (2007), Copenhagen (2009), Cancun (2010), Durban (2011), Doha (2012), Warsaw (2013), and Lima (2014) where various agreements on how to mitigate and adapt to the effects of climate change were reached. However, most of these agreements are political agreements and do not have the binding legal effect of a treaty.

¹⁵⁹ Jacob Wertsman, *supra* note 109.

¹⁶⁰ Global Environment Facility is the main financial mechanism of the UNFCCC.

The UNFCCC member states also entrenched a model of integration by ending the division of the world into developed and developing countries with regard to the global climate change regime.

Both developed and developing states under the Copenhagen Accord agreed for the first time to reduce their emissions and to register their national commitments.¹⁶¹ However, the Copenhagen Accord was a political agreement and had no binding legal effect on the member states. The Lima Accord for Climate Action prepared the way for a model of integration by ending the partitioning of the world into developed and developing countries¹⁶² concerning climate change matters and significantly, it also required all countries to announce their emissions reduction targets.

1.3.J.ii. Comment on Climate Change Regulation and the Achievement of Legally Binding Obligations

Generally, international law can operate in three important but different ways: a contractual function, a prescriptive function, and a facilitative function.¹⁶³ Usually, global negotiations are based on a contractual model and it has been argued that countries participate in treaty negotiations because they think they will be better off with a treaty than without on the grounds that a treaty improves a country's geopolitical position and status.¹⁶⁴ From a contractual perspective, the premise of the international climate negotiations is that there are potential outcomes that would yield a net global benefit: that is, outcomes where the costs of reducing emissions are outweighed by the benefits of avoiding climate change. For example, the negotiation of the Kyoto Protocol Annex B targets were arguably predicated on the contractual model of international law and many assumed that the Durban Platform negotiations should

¹⁶¹ National Resources Defense Council, *supra* note 131.

¹⁶² Michael Jacobs, *supra* note 151.

¹⁶³ Daniel Bodansky, "The Durban Platform Negotiations: Goals and Options." (2012) Policy Brief, Harvard Project on Climate Agreements, Belfer Center for Science and International Affairs, Harvard Kennedy School online: <http://belfercenter.ksg.harvard.edu/publication/22196/durban_platform_negotiations.html> (accessed 29 June 2016).

¹⁶⁴ *Ibid.*

follow this model as well. But the contractual model faces several difficulties in the climate-change context.¹⁶⁵

Daniel Bodansky submits that there is relatively little acceptance of the contractual model in the climate-change context because some states do not take the climate change problem seriously.¹⁶⁶ The more fundamental challenge is that, in deciding whether to make climate change commitments, states do not only consider environmental and economic costs and gains; they also weigh the costs to their national autonomy, independence and sovereignty, which are potentially significant.¹⁶⁷ This is a big challenge because climate change implicates virtually every aspect of domestic policy, including energy, industrial, transportation, agricultural, and land-use policy. Accordingly, the climate-change regime raises much greater domestic sensitivities than other global regimes, which have a more restricted scope.¹⁶⁸

However, it is the opinion of the author that the environmental benefits of a binding climate agreement clearly exceed the costs to Nigeria's autonomy, since Nigeria and the entire Africa will be most heavily affected by the impacts of climate change.¹⁶⁹ Therefore, regardless of whether climate change commitments are binding from an international law perspective or not, there is an urgent practical need for Nigeria to take important steps towards diversifying its energy sector and integrate climate change objectives with energy security objectives.

In a prescriptive model, some deliberations about climate change suppose that international law can dictate what countries should do, though they do not usually say so expressly.¹⁷⁰ The prescriptive model, according to Bodansky, "is the basis of domestic legal systems, in which legal institutions can create winners and losers—legislatures by prescribing new legal rules and courts by applying them to particular disputes."¹⁷¹ Thus, globally, "a prescriptive model would require analogous institutions that could impose legal rules on non-consenting parties—for

¹⁶⁵ *Ibid.*

¹⁶⁶ *Ibid.*

¹⁶⁷ *Ibid.*

¹⁶⁸ *Ibid.*

¹⁶⁹ CB Field et al., *supra* note 20.

¹⁷⁰ Daniel Bodansky, *supra* note 163.

¹⁷¹ *Ibid.*

example, through Conference of Parties (COP) decisions adopted without consensus or through judicial opinions.”¹⁷²

How well does the prescriptive model ensure that climate change commitments are binding from an international law perspective? Bodansky submits that “the prescriptive model founders on the problem of compliance. Since enforcement mechanisms are conspicuously absent in international law, international law has no way of inducing states to comply with its prescriptions.”¹⁷³

The facilitative model of international law suggests that climate negotiations and outcomes “should instead seek an outcome that reflects a different model of international law, which focuses on its catalytic and facilitative role”.¹⁷⁴ The question is how the international climate change regime can best promote, strengthen, and further the implementation of climate change commitments by states. International law, according to Peter M. Haas, Robert O. Keohane, and Marc Levy, “can serve a number of catalytic and facilitative functions”.¹⁷⁵ For example, the Copenhagen Accord, Cancun Agreements, and the Lima Accord “reflect a facilitative model by seeking to promote national pledges, establishing reporting and assessment mechanisms to promote transparency, and creating the Green Climate Fund to assist developing countries with mitigation and adaptation.”¹⁷⁶

Moreover, in their seminal article, Keohane, Abbott, Slaughter, Snidal and Moravesik expanded on their factors of “hardness” for international law.¹⁷⁷ They enunciated three criteria: precise wording, providing binding obligation, and a degree of delegation. Therefore, if international

¹⁷² *Ibid.*

¹⁷³ *Ibid.*: “For example, even if the International Court of Justice (ICJ) were to issue an advisory opinion finding that international law requires states to reduce their emissions, the opinion is unlikely to change the behavior of key countries such as the United States and China”.

¹⁷⁴ Miranda Schreurs, “From the Bottom Up: Local and Subnational Climate Change Politics,” (2008) 17 *Journal of Environment and Development* 343.

¹⁷⁵ Peter M. Haas, Robert O. Keohane & Marc Levy, *Institutions for the Earth: Sources of Effective International Environmental Protection* (Cambridge: MIT Press, 1993).

¹⁷⁶ Daniel Bodansky, *supra* note 163; Daniel Bodansky, “Governing Climate Engineering: Scenarios for Analysis” (2011) Harvard Project on Climate Agreements, Discussion Paper 11-47 online: <<http://belfercenter.ksg.harvard.edu/files/bodansky-dp-47-nov-final.pdf>> (accessed 29 June 2016).

¹⁷⁷ Abbott et al., “The Concept of Legalization” (2000) 54:3 *International Organization* 401-419; Kenneth W. Abbott and Duncan Snidal, “Hard and Soft Law in International Governance” (2000) 54:3 *International Organization* 421-456.

agreements are impaired along these aspects, they enter the domain of soft law.¹⁷⁸ One of the principal arguments for governance by the COP decisions in the climate regime is that they do not, as things-in-themselves, require ratification.¹⁷⁹ Nonetheless, it is pertinent to note that “in several countries, the content of an international instrument – rather than its name or status – determines the legal procedures through which it must be transposed into national legislation”.¹⁸⁰ Accordingly, this means that for many states, “the more substance that is captured in COP decisions, the more likely they are to require ratification in accordance with national constitutional requirements”.¹⁸¹ In the case of Nigeria however, this arrangement has effectively prevented most environmental treaties from being implemented into domestic legislation.

Thus as described by UJ Orji,

...the failure of international environmental law regimes to serve as effective pollution control mechanisms is linked to the fact that international controls and enforcement are generally uncoordinated and weak. Accordingly, it has been noted that: ‘the difficulty in pursuing environmental governance at a universal scale is compounded by the fact that there is no central institutional “sovereign” to craft sweeping environmental protections at the international level and to insist on compliance’.¹⁸²

Similarly, as also aptly put by Orji, the “mere signing or adoption of an international legal instrument by the Nigerian Government does not suffice to invest such legal instrument with the force of law in Nigeria, except where such legal instrument has been ratified or domesticated by the National Assembly.”¹⁸³ And furthermore, ratification or adoption of an international instrument may take years or may never take place at all.

Even so, regardless of technical domestic ratification, it is the author’s view that the global climate change response is nonetheless set to have great effect on energy policy in Nigeria in the coming decades. Practically speaking, states will be under global pressure to diversify their

¹⁷⁸ *Ibid.*

¹⁷⁹ Erkki Hollo, Kati Kulovesi, Michael Mehling, *Climate Change and the Law* (Berlin: Springer Science & Business Media, 2012) 149.

¹⁸⁰ *Ibid.*

¹⁸¹ *Ibid.*

¹⁸² UJ Orji, “An Appraisal of the Legal Framework for the Control of Environmental Pollution in Nigeria” (2012) 38 Commonwealth Law Bulletin 321 at 342.

¹⁸³ *Ibid.*

energy generation sources and develop renewable energy generation capacities. This will have serious economic and political implications for states like Nigeria which rely heavily on oil and gas exports. 70 percent of Nigerian government revenues and 95 percent of its foreign exchange earnings rely on oil and gas export.¹⁸⁴

Furthermore, although Nigeria has not ratified all climate change treaties, it has ratified UNFCCC and the Kyoto Protocol and has implemented legislation that potentially presents a framework to house integrated energy security and climate change policy objectives (discussed further below).

1.4. Domestic Responses to Climate Change

In the 1980s and 1990s, Nigeria ratified a number of international instruments on the environment, undergoing a radical evolution in its environmental law regime during this period.¹⁸⁵ However, Nigeria did not have any consolidated national policy on the environment despite the fact that the government put some environmental statutes into effect.¹⁸⁶ In 1989,¹⁸⁷ the Federal Government of Nigeria commissioned and published a comprehensive National Policy on the Environment¹⁸⁸ which encourages “the prevention and management of natural disasters such as floods, drought, and desertification”.¹⁸⁹ In line with this “National Policy”,¹⁹⁰

¹⁸⁴ See, Adeola Adenikinju, “Efficiency of the Energy Sector and its Impact on the Competitiveness of the Nigerian Economy” (2008) International Association for Energy Economics.

¹⁸⁵ See generally, S Simpson and O Fagbohun eds., *Environmental Law and Policy* (Lagos: Law Centre, Faculty of Law, Lagos State University, 1998) 10-49.

¹⁸⁶ See Gozie Ogbodo, “Environmental Protection in Nigeria: Two Decades after the Koko Incident” (2009) Annual Survey of International and Comparative Law at 1 and Kaniye Ebeke, “Oil and the Niger Delta People in International Law: Resource Rights” (2006) Environmental and Equity Issues, 189.

¹⁸⁷ In 1989, Nigeria also signed the Basel Convention on Transboundary Movement of Hazardous Waste and since then, it has signed 12 out of the 14 international treaties and protocols in relation to protection of the environment and sustainable development: Vanguard, “Nigeria Ranked High in Implementation of Environmental Agreements”, *Vanguard* (2 September 2013) Vanguard online: <<http://www.vanguardngr.com/2013/09/nigeria-ranked-high-on-implementation-of-environmental-agreements/>> (accessed 25 December 2014).

¹⁸⁸ Federal Republic of Nigeria, *National Policy on the Environment* (Abuja: FRN, 1989); See also discussion in UJ Orji, “An Appraisal of the Legal Framework for the Control of Environmental Pollution in Nigeria” (2012) 38 Commonwealth Law Bulletin 321 at 326.

¹⁸⁹ Building Nigeria’s Response to Climate Change, “Climate Change Information on Nigeria” (2008) 26 BNRCC online: <<http://www.nigeriaclimatechange.org/ccinfo.php>> (accessed 14 February 2015). The National Policy on the Environment was to address and coordinate the goals of environmental protection and the conservation of natural resources for sustainable development by making sure that environmental aspects are considered in major economic decision making processes; economic instruments and environmental reporting are employed in the management of natural resources; the best practicable environmental technology are applied in major economic activities; environmental impact assessment is mandatory before any major development project is embarked

Nigeria committed itself to sustainable development leading to the establishment of the Federal Environmental Protection Agency (FEPA),¹⁹¹ the first principal environmental regulatory body. The FEPA, however, could not ultimately carry out its responsibilities because of weak enforcement mechanisms for existing environmental laws and regulations.¹⁹²

Presently, the environmental regime in Nigeria is promoted by the National Environmental Standards and Regulations Enforcement Agency established under the *National Environmental Standards and Regulations Enforcement Agency (Establishment) Act* (“NESREA Act 2007”) which came into force in 2007.¹⁹³

There is no law exclusively dealing with climate change in Nigeria,¹⁹⁴ despite having signed the UNFCCC in 1992 and ratified it in 1994. That said, while Nigeria does not have specific legislation on climate change, there are still rules and policies applicable and related to climate change regulation in Nigeria.

1.4.A. The National Environmental Standards and Regulations Enforcement Agency (Establishment) Act 2007

The NESREA Act 2007 is aimed at sustainable development, the protection of the environment and rational use of natural resources. The Act establishes the National Environmental Standards

upon; environmental monitoring and auditing is routinely carried out in major economic activities; there is a periodic review of the state of the nation’s environment and the suitability and effectiveness of the National Policy on the Environment and the strategic objectives; enactment of necessary legal instruments to strengthen and implement the strategies adopted under this Policy and providing enforcement tools therefore and; where necessary establish organs, institutions and structures to achieve the objectives of this Policy.

¹⁹⁰ Note that the National Policy on Environment of November 1989 was revised in 1999.

¹⁹¹ Note that the FEPA was created through the FEPA Decree (now Act) of 1992. See *Federal Environmental Protection Act*, LFN 2004, Cap F 10, s.4, as repealed by *National Environmental Standards Regulations and Enforcement Agency (Establishment) Act* (July 2007) Act No. 25 94/92 Official Gazette of the Federal Republic of Nigeria 31 (hereafter “NESREA Act”).

¹⁹² Therefore, it was subsumed under the Federal Ministry of Environment. See MA Ajomo and O Adewale eds., *Environmental Law and Sustainable Development in Nigeria* (Lagos: Nigerian Institute of Advanced Legal Studies, 1994).

¹⁹³ In 2007, the FEPA Act was repealed by the NESREA Act. The NESREA Act was enacted and published in the Federal Republic of Nigeria Official Gazette No. 92, Vol. 94 of 31 July, 2007.

¹⁹⁴ Note that there is a Climate Change Commission Bill that was passed and harmonized by the National Assembly in 2010 and 2011; respectively, but has not received Presidential Assent that will make it legally effective. Climate Change Commission Bill, 2011, [HB. 30] No. C 531-C 540 (Climate Change Commission Bill); See Greg Odogwu, “COP 19: From Prince Fadina to Hamzat Lawal” *The Punch* (12 December 2013) *The Punch* online: <<http://www.punchng.com/opinion/cop-19-from-prince-fadina-to-hamzat-lawal/>> (accessed 18 December 2014).

and Regulations Enforcement Agency (NESREA) which is administered by the Ministry of Environment.¹⁹⁵ NESREA is commissioned to enforce and implement all environmental laws, guidelines, standards and regulations in Nigeria but excluding important oil-related environmental laws and regulations in the oil and gas industry.¹⁹⁶ NESREA is also empowered with the authority to administer compliance with international protocols, pacts, and treaties on the environment.¹⁹⁷

Regrettably however, as noted by Lisa Stevens, the powers and duties of NESREA are unequivocally ousted in the Nigerian oil and gas industry – an industry that constitutes the greatest threats to the stability of the climate system.¹⁹⁸ A number of provisions exclude the supervisory powers of NESREA in the oil and gas industry.¹⁹⁹ Therefore, NESREA is precluded from implementing or enacting dangerous waste regulations in the Nigerian oil and gas industry.²⁰⁰ It is also excluded from auditing, researching, monitoring and assessing the environmental policies and practices in the oil and gas industry. This exclusion means that NESREA, in its present state, is not empowered to regulate or set limits to the rate of emissions in the oil and gas industry. This incapacity alone constitutes a major threat to promoting and realizing the dual objectives of energy security and climate change responses in Nigeria.

On the other hand, according to section 27 of the NESREA Act, it is illegal to release hazardous substances in dangerous quantities into the environment (air, land, and water), except when authorized by any law. Since practices in the oil and gas industry lead to the emission of hazardous materials that threaten the stability of the climate system and have deleterious effects

¹⁹⁵ For a comprehensive analysis of the NESREA Act 2007 *supra* note 207, see, MT Ladan, “*Law, Cases and Policies on Energy, Mineral Resources, Climate Change, Environment, Water, Maritime, and Human Rights in Nigeria*” (Zaria: Ahmadu Bello University Press, 2009) 357-378.

¹⁹⁶ Note also that the National Environmental Standards and Regulations Enforcement Agency (NESREA) has the mandate to oversee compliance with environmental regulations of the federal and state governments, and issue necessary licenses and permits. See *NESREA Act, ibid* sections 1 and 2.

¹⁹⁷ *NESREA Act, ibid.*, section 7. However, note that for NESREA to enforce compliance with the provisions of the global treaties to which Nigeria is a state party, such treaties would first of all have to be domesticated before they could be said to properly ‘come into force’. See Constitution of the Federal Republic of Nigeria, section 12(3).

¹⁹⁸ Lisa Stevens, “The Illusion of Sustainable Development: How Nigeria’s Environmental Laws are Failing the Niger Delta” (2012) 36 *Vermont Law Review* 387 at 395.

¹⁹⁹ *NESREA Act, supra* note 191 at Pt 2, Sections 7 and 8.

²⁰⁰ *NESREA Act, ibid*, sections 24, 29 and 30 create further exceptions for the oil and gas industry. Section 29, for example, requires NESREA to liaise with other government agencies for the removal of any pollutant discharged into the Nigerian environment and to implement the application of best technology and environmental practices excluding the oil and gas industry.

on ecology and health, they qualify as hazardous and hence, come within the purview of section 27 of the NESREA Act. While this is a possible tangible regulatory linkage between climate change and energy security objectives, the challenge here is that the NESREA Act does not define or establish the quantity of hazardous substances that will be deemed deleterious and as such illegal.²⁰¹

In terms of partnership and collaboration, NESREA is permitted under its enabling law to co-operate with international bodies and Non-Governmental Organizations including United Nations Agencies²⁰² e.g. United Nations Framework Convention on Climate Change (UNFCCC), United Nations Environment Programme (UNEP), etc., which allows NESREA to comply with global best standards and practices in discharging its duties under the law.

1.4.B. Climate Change Commission Bill²⁰³

In 2011, the Bill to Establish the Climate Change Commission was passed by both Houses²⁰⁴ of Nigeria's National Assembly. The Bill cannot yet validly operate as law because it has not been signed by the President,²⁰⁵ a requirement prescribed by the Nigerian Constitution.²⁰⁶ The Bill seeks to confront crucial climate change matters by furnishing a legal regime for climate change control and administration in Nigeria. The Bill, when granted Presidential Assent,²⁰⁷ will operate to create a platform for formulation of policies to tackle environmental and ecological practices in Nigeria that threaten the security of the climate system. Indeed, it is the legal document the country requires to undertake the implementation and ensure national compliance with

²⁰¹ Evaristus Oshionebo, *Regulating Transnational Corporations in Domestic and International Regimes An African Case Study* (Toronto: University of Toronto Press Incorporated, 2009).

²⁰² MT Ladan, "Review of NESREA Act 2007 and Regulations 2009 – 2011: A New Dawn in Environmental Compliance and Enforcement in Nigeria" (2012) 8 Law, Environment and Development Journal 116.

²⁰³ *A Bill for an Act to Establish the National Climate Change Commission and for Other Related Matters Connected Therewith*, 2011, [HB. 30] No. C 531-C 540.

²⁰⁴ The Senate and the House of Representatives of the Federal Republic of Nigeria passed this Bill in 2011 in accordance with the Constitution of the Federal Republic of Nigeria, section 4 (1) which vests the legislative powers of the Federal Republic of Nigeria in the National Assembly.

²⁰⁵ See, Daily Independent, "Environmentalists urge President Jonathan to sign Climate Change Bill" Daily Independent (28 July 2014) Daily Independent online: <<http://dailyindependentnig.com/2014/07/environmentalist-urges-jonathan-sign-climate-change-bill/>> (accessed 18 December 2014).

²⁰⁶ *Constitution of the Federal Republic of Nigeria*, LFN 2004, Cap 62 s. 59.

²⁰⁷ *Ibid.*

commitments under the UNFCCC, Kyoto Protocol, and other related global climate change treaties/agreements.²⁰⁸

The draft bill charges the proposed Climate Change Commission (CCC) with responsibility for the strategic planning and co-ordination of national policies in the field of climate change and energy in all its ramifications.²⁰⁹ Specifically, the proposed CCC shall, *inter alia*: advise the federal government on policies and priorities on the global climate change regime and its effects on the country;²¹⁰ initiate research in technology use, acquisition and deployment to reduce impact of climate change;²¹¹ establish programmes for prevention, reduction, and elimination of greenhouse gases in the nation's air, land and inter-state waters;²¹² serve as the centre for gathering and disseminating information related to national policy on climate change, its effects and mitigation;²¹³ and make recommendations for exploiting of other renewable sources of energy.²¹⁴

Furthermore, the draft bill makes provision for the implementation of regulations, strategies and policies governing domestic and global regimes on climate change as outlined in the UNFCCC, Kyoto Protocol, and Marrakesh Accords. It is anticipated that the bill should be granted Presidential Assent soon. Given its mandate and the regulatory strength of domestic legislation, this bill potentially offers the critical legal entry point for climate change and energy security integration and coordination in Nigeria.²¹⁵

1.4.C. National Institutional Framework for Climate Change Response

²⁰⁸ See Climate Change Commission Bill, *supra* note 192, s. 7 (i).

²⁰⁹ Climate Change Commission Bill, *ibid* at s. 7.

²¹⁰ Climate Change Commission Bill, *ibid* at s. 7 (a).

²¹¹ Climate Change Commission Bill, *ibid* at s. 7 (b).

²¹² Climate Change Commission Bill, *ibid* at s. 7 (d).

²¹³ Climate Change Commission Bill, *ibid* at s. 7 (f).

²¹⁴ Climate Change Commission Bill, *ibid* at s. 7 (k).

²¹⁵ Aaron Sayne, "Climate Change Adaptation and Conflict in Nigeria" (2011) United States Institute of Peace online: <http://www.usip.org/sites/default/files/Climate_Change_Nigeria.pdf> (accessed 3 February 2016); MT Ladan, *supra* note 202.

As is likely now apparent, the response of the Federal Government of Nigeria to climate change has not been encouraging,²¹⁶ not unlike other state governments.²¹⁷ In 2003, Nigeria's First National Climate Change Communication was released and the Federal Government established the Special Climate Change Unit subsumed under the Federal Ministry of Environment as a national central entity to coordinate Nigeria's response to climate change.²¹⁸ The Federal Ministry of Environment has a mandate to preserve and improve the environment by ensuring the sustainable use of its resources including energy resources. The Ministry launched the National Policy and Guidelines on Renewable Energy and inaugurated a number of low-carbon projects around Nigeria.²¹⁹ Also, agencies of the Federal Government like the Energy Commission of Nigeria²²⁰ (ECN)²²¹ and the Renewable Energy Division (RED)²²² of the Nigerian National Petroleum Corporation (NNPC) operate in a practical way to promote the dual objectives of climate change response and energy security in Nigeria through low-carbon energy development.²²³ The Federal Ministry of Power also produced quite a few energy policy documents towards promoting electricity generation powered by renewable energy resources and initiated a few renewable electricity and hydropower projects in Nigeria.²²⁴

²¹⁶ Note that Nigeria's obligations under the Kyoto Protocol as a Non-Annex I country include producing four National Communications, four in-depth Review Summaries, one Progress Report, a National Adaptation Program of Action, and a Global Climate Observing System Report.

²¹⁷ See generally, Aaron Sayne, *supra* note 215.

²¹⁸ *Ibid.*

²¹⁹ However, it is pertinent to note that the Ministry of Environment lacks the influence in government to provide robust leadership in the transition to low-carbon climate and energy resilient development. See Ann Ogbo, Ndubuisi Lauretta & Wilfred Ukpere, "Risk Management and Challenges of Climate Change in Nigeria" (2013) 41:3 Journal of Human Ecology 221-235.

²²⁰ The ECN was established by Act No. 62 of 1979, as amended by Act No. 32 of 1988 and Act No. 19 of 1989.

²²¹ The ECN stimulates the diversification of Nigeria's energy sources as well as the promotion of the most beneficial use of these resources. It has the principal statutory mandate to plan and co-ordinate the country's national energy policies. The ECN has produced key policy documents like the National Energy Policy and the Renewable Energy Master Plan. The Commission has also succeeded in carrying out a number of renewable energy model projects around Nigeria. See E Eleri, P Onuvae & O Ugwu, "Low-Carbon Energy Development in Nigeria: Challenges and Opportunities" (2013) International Institute for Environment and Development (IIED) online: <<http://pubs.iied.org/pdfs/G03555.pdf>> (accessed 29 June 2016).

²²² This Division of the NNPC is commissioned to link the agricultural sector with the oil and gas sector through the domestic production of biofuels in a manner to promote the optimal utilization of other renewable energy sources. It developed the National Biofuels Policy to advance the biofuels industry in Nigeria. The Division has initiated a number of biofuels projects in Nigeria with insignificant results. See SO Akande and FB Olorunfemi, "Research and Development Potentials in Biofuel Production in Nigeria" (2009) 3:3 African Research Review 34-45.

²²³ See E Eleri et al., *Towards a Low Carbon Industrial Strategy for Nigeria* (London: Global Climate Network, 2011).

²²⁴ SO Oyedepo, "On Energy for Sustainable Development in Nigeria" (2012) Renewable and Sustainable Energy Reviews 2583-2598.

The implementation strategy in *Nigeria Vision 20:2020* includes, “[reducing] the impact of climate change on socio-economic development processes” as one cardinal objective for conserving and preserving the environment for sustainable economic development and growth.²²⁵ At the national level, the *Climate Change Response and Strategy* is the all-inclusive document which governs the direction of the country on climate change matters.²²⁶ The Nigerian Meteorological Agency, the National Planning Commission and the National Emergency Management Authority are also institutions of the Federal Government of Nigeria involved in climate change adaptation matters.²²⁷ It is expected that the proposed Climate Change Commission will harmonize and integrate the efforts, policies and frameworks of the various climate change institutions when the draft Bill goes into effect (as already discussed) in order to avoid unnecessary duplication of functions. This should also lead to the preparation of a legal framework that can allow Nigeria to benefit from the various global funds launched to assist developing countries in mitigating and adapting to the climate change impacts.

As described earlier, the principal focus of the global community is on mitigation measures to reduce emissions and increase the sinks of greenhouse gases to prevent catastrophic climate change impacts. However, Nigeria as a developing state was never a major player in the Kyoto Protocol and did not play any active role in the fight to keep climate change effects at tolerable levels. Nigeria is dwarfed as a greenhouse producer by more industrialized states.²²⁸ Therefore, recent climate strategies of the Nigerian government do not actually indicate any bold desire or aspirations to cut GHG emissions. Indeed, Nigeria remains the second largest gas flaring country in the world.²²⁹

²²⁵ Building Nigeria’s Response to Climate Change, *supra* note 189 at 25.

²²⁶ *Ibid* at 26.

²²⁷ Other climate change policies and frameworks/initiatives include: Strategic Framework for Voluntary Nationally Appropriate Mitigation Action (NAMA), National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN), First National Communication to the UNFCCC, Climate Change Policy and Response Strategy. Also, the government reaps benefits from the efforts of non-government bodies like the BNRCC (Building Nigeria’s Response to Climate Change) and the NEST (Nigeria Environmental Study/Action Team). See AWEPA Parliamentary Support Program in South Africa, “Review of International & African Climate Change Legislation and Policies” (2012) Sustainability Institute.

²²⁸ Aaron Sayne, *supra* note 215 at 8.

²²⁹ Gas flaring refers to “the burning of gases associated with petroleum during oil exploitation activities”, see, Orji *supra* note 198 at 324; “Gas flaring is a controversial environmental issue because it contributes significantly to greenhouse gas (GHG) emission and can be seen from an economic perspective as a waste of valuable energy resources. ... The Nigerian case of gas flaring attracts attention worldwide because it flares more ANG than any

Similarly, the global climate change regulatory regime also emphasizes adaptation to the impacts of a changing climate system through the concurrent implementation of mitigation and adaptation strategies. The Nigerian Meteorological Agency, the National Planning Commission and the National Emergency Management Authority are among the Nigerian institutions charged with the implementation of climate change adaptation strategies. These institutions however, have been largely underdeveloped and under-utilized²³⁰ and there is no oversight body to harmonize and coordinate their activities.

On the other hand, the model of integration championed by the Lima Accord for Climate Action which ends the division of developing and developed countries under the climate regime indicates that Nigeria would be required to announce its emissions reduction target before the climate summit in Paris (2015). Accordingly, on the 28th of November, 2015, Nigeria pledged “to reduce emissions by 20% unconditionally and 45% conditionally, compared to business-as-usual levels, by 2030”.²³¹

With these new commitments, Nigeria needs to put in place practicable strategies to address its emerging climate change obligations.²³²

1.4.D. Constraints in Implementation of Climate Change Risk Regulation

Some of the challenges confronting the formulation and implementation of bold climate change policy initiatives include the problem of reaching an agreement on a consolidated, inclusive law and ambitious climate regime, lack of powerful climate policy implementing and enforcement authority, differences in the distribution of technology, and disparities between different nations and regions with respect to natural and financial resources.²³³

Notwithstanding recent commitments, within Nigeria, there remains a lack of unified national climate change law to harmonize the efforts, policies, and activities of the various climate change

other country in the world except Russia,” see, Aminu Hassan, “Gas Flaring in Nigeria: Analysis of Changes in its consequent carbon emission and reporting” (2013) 37:2 Accounting Forum 124 at 124.

²³⁰ Aaron Sayne, *supra* note 215 at 12.

²³¹ Carbon Brief CLEAR ON CLIMATE CHANGE, “Paris 2015: Tracking country climate pledges” (2015) Carbon Brief online: <<http://www.carbonbrief.org/paris-2015-tracking-country-climate-pledges#>> (accessed 4 February 2016).

²³² Aaron Sayne, *supra* note 215 at 7.

²³³ *Ibid* at 279.

institutions. This will continue to be a significant impediment to progress in tackling the climate change problem. To address the problem of climate change, there should be a legally empowered national authority to supervise and co-ordinate the implementation of the global and national climate change policies. The establishment of a national group to give focus to climate change initiatives has been identified as one of the factors capable of mainstreaming practical and legal climate change mitigation and adaptation strategies.²³⁴ But, the historic absence of such a national authority has demonstrated a continued lack of focus in implementing climate change initiatives in Nigeria. The lack of understanding of the impacts of climate change at different levels of government and the absence of a unified vision and approach²³⁵ are also ongoing challenges faced in addressing the climate change problem.

While the Climate Change Commission Bill could potentially address some of the above concerns such as the lack of a legally empowered oversight authority it still has not been passed into law.

The government has demonstrated a lack of domestic political will to fight climate change²³⁶ with ambitious actions, despite its climate talk rhetoric. Accordingly the question becomes, can this disinterest in climate change be tackled through other more immediately pressing, yet corollary objectives of the state such as energy security?

1.5. Projecting Climate Change Impacts on Energy Security

1.5.A. Energy Security-Climate Change Nexus: Antagonism or Synergy?

The advent of anthropogenic climate change as a recent and significant energy policy concern necessitates that more serious attention and consideration should be given to interactions between various policy efforts and initiatives in the future.²³⁷ The most direct and coherent

²³⁴ Olanrewaju Fagbohun, "Implementing an Effective Regulatory Scheme for Climate Change in Nigeria: The Role of Law" (2011) 1 Nigerian Institute of Advanced Legal Studies Journal of Environmental Law 283 online: <<http://www.elri-ng.org/Implementing%20An%20Effective%20Regulatory%20Scheme.pdf>> (accessed 25 January 2015).

²³⁵ *Ibid* at 288.

²³⁶ *Ibid* at 291.

²³⁷ Nicolas Lefèvre, *Energy Security and Climate Policy: Assessing Interactions* (Paris: International Energy Agency, 2007) 24.

relationship identified was the connection between energy security and climate change policy.²³⁸ The United Kingdom Ministry of Defence established that climate change mitigation policies will have monumental impacts on energy usage and energy security by 2040.²³⁹

Proper implementation of climate change mitigation policies²⁴⁰ require that greenhouse gas emissions associated with energy usage through the combustion of fossil fuels be drastically reduced.²⁴¹ A number of methods can be used to execute emission reductions strategies. For example, the International Energy Agency has recognized carbon taxes and emissions trading schemes as instruments embraced in cutting emissions.²⁴² The Agency also identified the “improved end-use efficiency” and the advancing carbon capture and storage technologies, including transition from fossil fuels to clean energy fuels, as other strategies that can be employed to reduce GHG emissions.²⁴³

Energy security policies and climate change mitigation policies can be mutually beneficial. Energy conservation measures can improve energy security.²⁴⁴ For example, policies that reduce demand for fossil fuels such as those that promote novel technology innovation make necessary energy efficiency initiatives²⁴⁵ that can further both energy security and climate change objectives.

A major strain identified between the energy security-climate change nexus is that policies designed to address each may call for execution at conflicting periods.²⁴⁶ The threats that a changing climate system poses to global security evolve over decades, and many solutions require decades to be put into effect. But, the risks that energy disruptions constitute to energy

²³⁸ Marcus DuBois King and Jay Gulledge, *supra* note 51 at 34.

²³⁹ The UK Ministry of Defence, “Global Strategic Trends – Out to 2040” (12 January 2010) online: UK Ministry of Defence <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/33717/GST4_v9_Feb10.pdf> (accessed 26 January 2015).

²⁴⁰ The global community under the auspices of the UNFCCC defines climate mitigation as the “stabilization of greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with the climate system” (United Nations Framework Convention on Climate Change, Article 2, 1992).

²⁴¹ Nicolas Lefèvre, *supra* note 237 at 24.

²⁴² *Ibid.*

²⁴³ *Ibid.*

²⁴⁴ Marcus DuBois King and Jay Gulledge, *supra* note 51 at 35.

²⁴⁵ *Ibid.*

²⁴⁶ *Ibid.*

security and global and national economies will occur on a daily basis and climate policies can limit “near term energy supply options.”²⁴⁷

The urgent need to advance energy security and climate change objectives simultaneously is increasingly acknowledged by policymakers.²⁴⁸ The energy security-climate change nexus was underscored in the national energy policy plans released in the UK (DTI 2003), Australia (Department of Cabinet and Prime Minister, 2004), France (MINEFI 2003),²⁴⁹ and at the European Union level.²⁵⁰ Also, long-term strategies to advance both objectives will necessitate “higher prices for gasoline, electricity, and home heating oil”.²⁵¹ It is projected that pricing carbon emissions will lead to an increment in the cost of fossil fuels and dwindling energy security for most consumers in the short term, however, it (pricing carbon emissions) is capable of promoting long-term development of cleaner energy technologies.²⁵² Carbon pricing renders polluting activities more expensive and makes climate-friendly green energy technologies more affordable and accessible.

In order to promote balancing between climate change and energy security objectives, various policies have been made to stimulate the transition to climate-friendly green energy technologies. Such policies are likely to entail emerging strategic and political risks that must be properly evaluated in the course of addressing energy security, climate security, and human security concerns.²⁵³ For instance, as alluded to above, the response to climate change mitigation policy may lead to global nuclear energy demand growth.²⁵⁴ A rise in global demand for nuclear energy is further complicated by the fact that there is no clear distinction between the development of nuclear energy for peaceful purposes and non-peaceful purposes as the case of Iran also

²⁴⁷ *Ibid.*

²⁴⁸ Nicolas Lefèvre, *supra* note 237 at 24.

²⁴⁹ *Ibid.*

²⁵⁰ European Commission Green Papers on Energy Security (EC 2000), and the strategy for sustainable, competitive, and secure energy (EC 2006).

²⁵¹ J. Furman et al, “An Economic Strategy to Address Climate Change and Promote Energy Security” Brookings Institution (2007): <http://www.brookings.edu/papers/2007/10/climatechange_furman.aspx> (accessed 24 February 2015).

²⁵² The UK Ministry of Defence, *supra* note 239.

²⁵³ Marcus DuBois King and Jay Gulledge, *supra* note 51 at 37.

²⁵⁴ *Ibid.*

suggests.²⁵⁵ The social and economic consequences of climate change policies are capable of leading to energy security disruptions that can be significant and portentous.

The foregoing discussions have shown that “the energy climate relationship is interesting as it is a great example of a feedback effect... The causal link from emissions due to the combustion of fossil fuels to deliver energy services to climate change is well established.”²⁵⁶ Therefore, the term “energy security” is intended to express the relationship between the economic activities that occur in both domestic and global energy markets and the climate change response of states. Both governments and the public increasingly recognize that the linkage to climate change matters must be carefully assessed alongside economic considerations in adopting energy policies and energy security strategies.

1.5.B. Nigeria’s Future Legal Obligations

As noted earlier, the UNFCCC and the Kyoto Protocol embody the fundamental legal framework and the foundation for global collaboration to tackle climate change. These legal instruments also constitute consensus in the global community and represent the basis for regulating implementation of various decisions and resolutions negotiated and approved at the annual meetings of the Conference of Parties under the auspices of the UNFCCC.²⁵⁷ Nigeria as a developing country is a Non-Annex 1 Party under the Kyoto Protocol and has no legal obligation to cut its greenhouse gas emissions or set a target for GHGs emissions reductions. But, Nigeria is allowed to benefit from Clean Development Mechanism projects²⁵⁸ embarked upon by the Annex 1 Parties to reduce GHGs emissions in the territories of Non-Annex 1 Parties. In recent times, critical evaluation of various outcomes of the UNFCCC meetings indicates that developing countries like Nigeria, South Africa, Mexico, etc. would be required to make emissions reductions commitments in the nearest future under the legal framework of a new

²⁵⁵ Abdullah Toukan & Anthony Cordesman, “Options in Dealing with Iran’s Nuclear Program” (2010) Center for Strategic and International Studies Online: <http://csis.org/files/publication/100323_Options_todealwith_Iran.pdf> (accessed 28 January 2015).

²⁵⁶ Maximilian Auffhammer and Erin T. Mansur, “Measuring Climatic Impacts on Energy Consumption: A Review of the Empirical Literature” (2014) Journal of Economic Literature online: <http://www.dartmouth.edu/~mansur/papers/Auffhammer_Mansur_climateadaptenergy.pdf> (accessed 24 June 2016).

²⁵⁷ Donald Feaver and Nicola Durrant, *supra* note 88 and Anita M Halvorssen, *supra* note 91.

²⁵⁸ Kyoto Protocol, note 20, Article 12.

global climate change treaty that is being negotiated. Nigeria's fossil-fuel dependent economy renders it a prominent candidate for setting a target for emissions reduction. For example, under the Copenhagen Accord, both developed and developing countries²⁵⁹ agreed for the first time to reduce emissions and register their national commitments by the end of January 2010.²⁶⁰ Also, under the 2014 Lima Accord for Climate Action, member countries of the UNFCCC agreed that both developed and developing countries must bring forward their emissions reductions commitments to the 2015 climate summit in Paris,²⁶¹ where a new legally-binding global climate change treaty was reached and finalized. The Lima Accord removed the longstanding division of the world into developed and developing countries and paved way for a model of integration and uniformity.²⁶² Therefore, based on the foregoing, Nigeria was expected to announce its greenhouse gas emission reductions target to be presented in late 2015 at the UNFCCC meeting in Paris, and this will form the basis of its future legal obligations under the legal framework set out by the UNFCCC. Therefore on the 28th of November, 2015, Nigeria pledged "to reduce emissions by 20% unconditionally and 45% conditionally, compared to business-as-usual levels, by 2030".²⁶³

1.6. A Preliminary Summary of the Climate Change - Energy Security Nexus

The growth in the use of energy generated from fossil fuels triggers global warming and other changes in the climate system. The impacts of climate change cause diverse, extreme and turbulent weather conditions, such as droughts, floods, sea level rise, desertification, hurricanes, and immense storms which, in turn, threaten energy security based on observed and anticipated destructive and devastating effects of these extreme weather conditions on energy systems and energy infrastructure. Further, energy security will be greatly influenced by climate change through the impacts of climate policies. Energy security policies may be consistent or incompatible with climate change policies. Transition from fossil fuels to clean energy

²⁵⁹ Major emerging economies like China, India, South Korea, Brazil, Indonesia, South Africa, and Mexico also agreed to economy wide targets to reduce or slow emission growth in greenhouse pollution. This is the most significant achievement in Copenhagen.

²⁶⁰ National Resources Defense Council, *supra* note 131.

²⁶¹ Jennifer Duggan, *supra* note 154.

²⁶² *Ibid.*

²⁶³ This is further discussed in Chapter 6 which is the Addendum to this thesis. Carbon Brief CLEAR ON CLIMATE CHANGE, "Paris 2015: Tracking country climate pledges" (2015) Carbon Brief online: <<http://www.carbonbrief.org/paris-2015-tracking-country-climate-pledges#>> (accessed 4 February 2016).

generation technologies is a recognized and essential strategy for reducing GHGs emissions. Therefore, the climate mitigation policies of governments will have significant effects on energy supply and energy security over a period of time including, in particular, the likelihood of major or minor energy disruptions in the process of transiting from fossil fuels to clean energy fuels.

1.7 Chapter One Observations

Environmental governance structures globally and in Nigeria have largely failed to date, due to uninspired and uncoordinated responses to climate change and energy security concerns. The lack of domestic legislation exclusively dealing with climate change in Nigeria indicates that the government does not have the foresight or a strong commitment to address climate change which in turn points to a lack of commitment (intentional or unintentional) to promote energy security, given the potential risks and threats that climate change poses to energy security. The literature on climate change impacts in Nigeria has failed to focus on the energy security dimension. It is now critical that policymakers be encouraged to tackle the dual challenges of climate change and energy security. The global focus on mitigation, cooperation, integration and uniformity has not been entirely successful because of the lack of overwhelming consensus and sincere commitments to tackle climate change.

Current commitments on GHG emissions run out in 2020, so at Paris, governments produced a binding agreement on what is to happen for the decade after that at least, and potentially beyond (this and other issues are further discussed in Chapter 6 in the Addendum to this thesis). Analysis endorsed by the UN, has suggested that the pledges made at Paris are enough to hold the world to about 2.7C or 3C of warming which is not quite enough to meet the scientific advice.²⁶⁴ Having now established in a preliminary way, the existence of a nexus (with regulatory implications) between climate change and energy security, we now turn to Chapter Two which explores in more detail the energy sector in Nigeria. Specifically, Chapter Two examines the essential features of the Nigerian energy industry and the challenges that continue to bedevil it. The overarching purpose of Chapter Two is to add to the foundation, a basis for the exploration of an integrated and practical response to climate change and energy security beyond policy discussion.

²⁶⁴ *Ibid.*

CHAPTER TWO: THE NIGERIAN ENERGY INDUSTRY

2.1. Introduction

In the world today, the prevalent energy sources are petroleum, coal, natural gas, biomass, and nuclear fuels, accounting for more than 80% of global primary energy consumption.¹ For example, 67% of the energy needed to produce electricity is generated from fossil sources.² Also, conventional oil will continue to influence the energy market into the foreseeable future. However, renewable energy sources are estimated to contribute almost 15% to global primary energy requirements by late 2030.³ One foremost challenge to global energy security is that fossil energies have determinate lifespans.⁴

Nigeria is the most populous nation in Africa, estimated at 162,470,737⁵, and the seventh most populous nation in the world.⁶ Nigeria, as a political entity, operates a federal system of government⁷ with 36 states and a federal capital territory situated in Abuja. The Nigerian energy industry⁸ is central to the country's economic growth and development; energy is crucial to all sectors of the economy. Historically, exploration of petroleum resources in Nigeria dates back to 1908, when German surveyors for the Nigerian Bitumen Corporation, started prospecting for Tar

¹ AA Awwad and AA Mohammed, "World Energy Road Map-A Perspective" in *Energy Future in an Interdependent World* (London: World Energy Council, 2007).

² PH Jean and DF Marc, "From a forced dependency to positive cooperation in the field of energy" in *Energy Future in an Interdependent World* (London: World Energy Council, 2007).

³ International Energy Agency, *World Energy Outlook* (Paris, France: IEA Publications, 2006).

⁴ Experts have argued that if global consumption continues at the present rate, the life span of commercially exploitable reserves for fossil fuels will be around 40 years for oil, about 60 years for gas, and roughly 230 years for coal. See PH Jean and DF Marc, *supra* note 2.

⁵ The World Bank, *Data*, online: <WBG http://data.worldbank.org/indicator/SP.POP.TOTL?cid=GDP_1> (accessed 11 February 2015).

⁶ *Ibid.*

⁷ Chukunonye Akujuru and Newman Chintuwa Enyioko, "True Federalism and Sustainable Development in Nigeria (A Discourse on National Question and/or National Maladies)" (2013) Social Science Research Network online: SSRN <<http://ssrn.com/abstract=2336606>> (accessed 25 March 2015).

⁸ The first commercial discovery of oil was made in Oloibiri, present day Bayelsa State, on January 15, 1956 by Shell D'arcy Petroleum (now known as Shell Petroleum Development Company). Therefore, Nigeria's onshore oil exploration and production is majorly carried out in the Niger Delta region of the country. See PO Itsuelli, "Environmental Pollution in Nigeria: An Appraisal of Corporate Social Responsibility for Victims of Oil Pollution in Nigeria" in Festus Emiri and Gowon Deinduomo, eds., *Law and Petroleum Industry in Nigeria: Current Challenges* (Lagos: Malthouse Press Ltd, 2009) 108.

Sand deposits in the South–Western part of Nigeria.⁹ With the outbreak of the First World War in 1914, these pioneering activities ended suddenly.¹⁰ In 1938, exploration of petroleum resources began, when Shell D’Arcy (a consortium of Iranian Oil Company (later British Petroleum) and Royal Dutch Shell) was granted an exclusive concessionary right over the whole country.¹¹ Nevertheless, the initial oil exploration activities by Shell D’Arcy were terminated by World War II (1939-1945).¹²

In 1946, oil exploration in the Nigeria’s Niger Delta resumed after World War II and Shell D’Arcy, which enjoyed an absolute monopoly of oil exploration between 1938 and 1955, drilled a number of oil exploratory wells in 1951.¹³ Then, in 1955, Mobil Producing (Nigeria) Ltd, a subsidiary of American Socony–Mobil Oil Company, obtained license to explore for oil and began operations in Nigeria under the name Mobil Exploration Nigeria Incorporated.¹⁴ In January 1956, the first commercial oil discovery in the Niger Delta was confirmed at Oloibiri field in January 1956 by Shell D’Arcy (later Shell–British Petroleum) and a second oil field was later discovered at Afam.¹⁵ Shell British Petroleum (now Royal Dutch Shell) started exporting crude oil produced from Oloibiri and Afam oil field.¹⁶ Also, in 1958, the giant Bomu oil field, which has estimated ultimate recovery (EUR) of 0.311 billion of barrels (BB) of oil and a total of 0.608 billion of barrels of oil equivalent (BBOE) and gas, was discovered southeast of Port Harcourt–Rivers State.¹⁷

In the early 1960s, the petroleum sector began to play a crucial role in influencing the Nigerian economic and political destinies. On October 1, 1960 when Nigeria became an independent nation, Shell–BP began to relinquish its acreage and its exploration licenses were converted into

⁹ Aniefiok E. Ite et al., “Petroleum Exploration and Production: Past and Present Environmental Issues in the Nigeria’s Niger Delta” (2013) 1:4 American Journal of Environmental Protection 78-90.

¹⁰ *Ibid.*

¹¹ *Ibid.*

¹² AW Genova, *Oil and Nationalism in Nigeria, 1970-1980* (Ann Arbor, Michigan: U Michigan, 2007).

¹³ *Ibid.*

¹⁴ Aniefiok E. Ite et al., *supra* note 9: Mobil Exploration Nigeria Incorporated was later incorporated as Mobil Producing Nigeria on June 16, 1969.

¹⁵ *Ibid.*

¹⁶ SR Pearson, *Petroleum and the Nigerian Economy* (Stanford: Stanford University Press, 1970).

¹⁷ *Ibid.*

prospecting licenses that allowed development and production.¹⁸ Accordingly, the sole concessionary policy was abandoned, following the increased dominance of the Nigerian economy by the petroleum sector, to encourage other multinational oil companies with a view to accelerating petroleum exploration and production.¹⁹ In 1961, Texaco Overseas Nigeria Petroleum Company Unlimited and other multinational oil companies²⁰ joined oil and gas exploration in Nigeria. Most of these multinational oil companies recorded significant successes in oil and gas exploration and production in both onshore and offshore fields in the Niger Delta region of Nigeria.²¹

In 1979, Nigeria nationalized British Petroleum's holding completely in order to take control of the country's petroleum industry and Shell-British Petroleum became Shell Petroleum Development Company of Nigeria (SPDC).²² The Niger Delta region is richly endowed with 31 giant oil and gas fields and each has an estimated ultimate recoverable oil of more than 500 million barrels and produces in excess of 1 million barrels a day out of the nation's total production of about 2.1 million barrels per day.²³ 17 of giant oil and gas production fields are located offshore including Bonga and Bonga Southwest which were discovered in 1996 and 2001, respectively and are operated by a joint venture led by SPDC.²⁴ Presently, Nigeria has more than 18 multinational oil companies which are involved in oil and gas exploration and production in its Niger Delta area²⁵ and the principal players include Royal Dutch Shell, ExxonMobil, ENI/Agip, Total Fina Elf and US-based Chevron Texaco.²⁶ The foregoing historical and economic factors have influenced and shaped the environmental and social relations of Nigeria at large, and its oil and gas sector more specifically. It has been widely

¹⁸ J Bamberg, *British Petroleum and Global Oil 1950-1975: The Challenge of Nationalism* (Cambridge: Cambridge University Press, 2000).

¹⁹ Aniefiok E. Ite et al., *supra* note 9.

²⁰ Amoseas in 1961, Gulf Oil Company in 1961 (now Chevron), Société Africaine des Pétroles (SAFRAP) in 1962 (which later later became Elf Nigeria Limited in 1974), Tennessee Nigeria Limited (Tenneco) in 1962, Azienda Generale Italiana Petroli (AGIP) in 1962, ENlin 1964, Philips Oil Company in 1964, and Pan Ocean Oil Corporation in 1972: *Ibid.*

²¹ *Ibid.*

²² AW Genova, *supra* note 12.

²³ NG Obaje, *Geology and mineral resources of Nigeria* (Berlin; London: Springer, 2009).

²⁴ S Vassiliou, *The A to Z of the Petroleum Industry* (Lanham, MD: Scarecrow Press, 2009).

²⁵ Aniefiok E. Ite et al., *supra* note 9.

²⁶ *Ibid.*

suggested that the political and economic power of the oil and gas sector is one of the major barriers to effective climate change mitigation and emissions reduction.²⁷

In Nigeria, the oil sector has determined the pace and shape of economic growth and development since the 1970s.²⁸ Between 1970 and 2005, the Nigerian economy grossed over US\$593.6 billion from oil exports, constituting 96.3% of total foreign exchange earned within that period.²⁹ Energy also fuels productive activities such as agriculture, manufacturing, commerce, mining, and industry. Therefore, inability to access affordable and environmentally friendly energy can contribute to poverty, deprivation, and economic downturn.³⁰ Sustainable and accessible energy is critical to poverty eradication and the security of a nation because of the key role it plays in economic progress and development.³¹ It is thus mandatory that the strategies for developing and managing the energy industry are capable of driving the economy towards sustainable development.³² Future economic growth and development in Nigeria relies on

²⁷ However, a more comprehensive discussion regarding the historical and economic contexts vis-à-vis environmental context is beyond the scope of this thesis. Therefore, for a detailed discussion and further reading in the area, see, G Goldman et al., *Assessing corporate influence on climate change dialogue: New Trends in Earth-Science Outreach and Engagement* (Cham: Springer, 2014) 3–19; CT Whitley and Robin M. Mills, “Capturing Carbon: the New War against Climate Change” (2013) *J Agric Environ Ethics* 1-2; E Moe, “Vested interests, energy efficiency and renewables in Japan” (2012) *40 Energy Policy* 260–273; SM Gardiner, “A perfect moral storm: climate change, intergenerational ethics and the problem of moral Corruption” (2006) *15 Environ Values* 397-413; AM McCright and RE Dunlap, “The politicization of climate change and polarization in the American public’s views of global warming” (2011) *52 Sociol. Q.* 155-194; J Lash and F Wellington, *Competitive Advantage on a Warming Planet* (Cambridge, MA: Harvard Business School Publishing; 2007); D Peetz and G Murray, “Financialization of corporate ownership and implications for the potential for climate action” (2013) *5 Crit Stud Corp Responsib Govern Sustain* 99–125.

²⁸ Adeola Adenikinju, “Efficiency of the Energy Sector and its Impact on the Competitiveness of the Nigerian Economy” (2008) *International Association for Energy Economics* 27.

²⁹ *Ibid.*

³⁰ SO Oyedepo, “Energy and sustainable development in Nigeria: the way forward” (2012) *2:15 Energy, Sustainability and Society* 1 [Online]: <<http://www.energysustainsoc.com/content/pdf/2192-0567-2-15.pdf>> (accessed 6 February 2015).

³¹ *Ibid.*; Dilip Ahuja and Marika Tatsutani, “Sustainable energy for developing countries” (2009) *2:1 S.A.P.I.EN.S* [Online] <http://sapiens.revues.org/823> (Accessed 9 February 2016); Amulya K.N. Reddy et al., “Energy and Social Issues” in *World Energy Assessment: Energy and the Challenge of Sustainability* (New York: United Nations Development Programme Bureau for Development Policy, 2000).

³² “Sustainable development” is defined as: “development which meets the needs of the present without compromising the ability of future generations to meet their own needs.” Generally, It is generally accepted that sustainable development calls for a convergence between the three pillars of economic development, social equity, and environmental protection., see, Vuk Jeremic and Jeffrey D Sachs, “The United Nations in the Age of Sustainable Development” (2014) *45:2 The Economic and Social Review*; OA Jesuleye, “Analysis and Policy Implications of Energy Demand in the Nigerian Petroleum Refining Industry” (MSC Thesis, Obafemi Awolowo University, 1999) [Unpublished] Sustainable development has been defined as “the development that meets the needs of the present without compromising the ability of future generation to meet their own needs”. See *Report*

enduring availability of energy from sources that are accessible, affordable, and environmentally friendly.³³

One way to achieve sustainable development is through entrenchment of sound energy security and climate change initiatives.³⁴ And the linkages between energy security and climate change are emerging at least at a policy level.³⁵ However, the foremost challenge in Nigeria as introduced in the previous chapter (and discussed further below) has been that execution of energy policy has continued to subvert the palpable and practical connections between energy security and climate change objectives.³⁶

Accordingly, this chapter examines essential features and structures of the Nigerian energy industry principally through the lens of energy policy objectives in order to demonstrate the influence energy policy objectives have on energy security and climate change objectives. Because a complete examination of the Nigerian energy sector is not possible within the confines of this discussion, the examination of the Nigerian energy industry is achieved principally through review of key energy policy reform initiatives taken by the Nigerian government. . Again, it is important to note that the development of policy statements is vital to law reform in Nigeria. As described in the previous chapter, Nigeria approved a National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPACCN) as a national document for implementing climate change initiatives and driving energy and environmental law activities in Nigeria.³⁷

Having identified key energy industry policy objectives in Nigeria, the projected and anticipated impacts of climate change on the energy industry are then analyzed and classified. This is

of the World Commission on Environment and Development: *Our Common Future*, WCED, 4th year, Annex, Agenda Item 1, UN Doc A/42/427 (1987).

³³ SO Oyedepo *supra* note 30.

³⁴ OA Jesuleye *supra* note 32.

³⁵ P Ramchandra and D Boucar, *Solar Lighting (Green Energy and Technology)* (London: Springer Publishing Company, 2011).

³⁶ Also, implementation of the Nigerian energy policy has undermined the significance and benefits of energy efficiency to the environment and economic growth/development. See generally, SO Oyedepo, "Energy Efficiency and Conservation Measures: Tools for Sustainable Energy Development in Nigeria" (2012) 2:3 International Journal of Energy Engineering 86.

³⁷ This is further illustrated and explained through Appendix 1. See, Building Nigeria's Response To Climate Change (BNRCC), "National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN)" (2011) 26 BNRCC online: <nigeriaclimatechange.org/docs/naspaAug2012.pdf> (accessed 5 February 2015).

followed by a consideration of patterns of energy consumption in Nigeria in order to refine projected impacts with a view to promoting energy conservation measures and the development of modern/clean energy alternatives by taking into consideration the increasing population growth and the understanding that the available oil and gas resources are limited and exhaustible. The chapter ends with another round of observations concerning the extent to which the Nigerian energy industry and energy policy can better respond to promotion of energy security through the application and integration of climate change regulatory objectives as elucidated in Chapter One.

To summarize then, the purpose of this chapter is to gain an overall perspective on the energy industry in Nigeria with particular focus on aspects of Nigerian energy policy that reveal energy security and climate change perspectives with a view to drawing out policy, trends and conceptual linkages between these areas. The considerations, trends and linkages identified are then applied to test and challenge the definition of energy security, the subject of the chapter to follow, Chapter Three.

2.2. Essential Features of the Nigerian Energy Industry

2.2.A. Nigerian Energy Resources: A Snapshot

The energy industry is the cornerstone of economic growth and development in Nigeria. Nigeria is fortunate to have huge energy resources and this gives the country sufficient opportunity to thoroughly revamp its economy and transform the lives of its citizens.³⁸ Energy plays an essential role in the nation's economy and serves as a commodity traded to earn national income.³⁹ It also serves as a diplomatic and political instrument serving the nation's manufacturing, transportation, health, education, and agricultural sectors.⁴⁰

Nigeria has an enormous supply of natural energy resources in both fossil and renewable energy sources. The country's economy is largely dependent on the oil and gas sector⁴¹ which now accounts for 95% of Nigeria's foreign exchange earnings, 80% of government revenue, 50% of

³⁸ Adeola Adenikinju, *supra* note 28.

³⁹ *Ibid.*

⁴⁰ AS Sambo, "Strategic developments in renewable energy in Nigeria" (2009) 4 International Association of Energy Economics 15-19.

⁴¹ SO Oyedepo, "Energy in Perspective of Sustainable Development in Nigeria" (2013) 1:2 Sustainable Energy 14-25.

national gross domestic product, and oil remains the principal source of foreign direct investment inflows in Nigeria.⁴² The oil and natural gas industries are primarily located in the Niger Delta region.⁴³

Nigeria became a member of the Organization of Petroleum Exporting Countries (OPEC) in 1971 when it achieved extraordinary proven oil reserve and production capacity.⁴⁴ Also, the Nigerian National Petroleum Corporation (NNPC),⁴⁵ a state-owned and controlled petroleum company was established in 1977.⁴⁶ Nigeria is Africa's energy giant. It ranks as the continent's largest oil producer and the 8th largest exporter of oil in the world.⁴⁷ Nigeria's proven oil reserve stood at 35 billion barrels with 2.5 million barrels per day production capacity, while natural gas reserves stood at 183 trillion cubic feet (placing Nigeria among the first ten countries with the largest gas reserves) at the end of March 2014.⁴⁸

Nigeria is endowed with other primary energy resources which include: tar sands (31 billion barrels oil equivalent); coal and lignite (estimated to be 2.7 billion tonnes).⁴⁹ 650 million metric tonnes of the country's estimated 2.7 billion metric tonnes coal reserve are proven reserves. Almost 95% of Nigeria's coal production has been used up locally mainly for industrial heating in the production of cement, electricity production, and railway transportation.⁵⁰ The Power Holding Company of Nigeria Plc (PHCN) is the largest consumer of natural gas, accounting for

⁴² Simon Warikyei Amaduobogha, "Environmental Regulation of Foreign Direct Investment in the Oil and Gas Sector" in Festus Emiri and Gowon Deinduomo, eds., *Law and Petroleum Industry in Nigeria: Current Challenges* (Lagos: Malthouse Press Ltd, 2009) at 108.

⁴³ United States Energy Information Administration, "Nigeria – Analysis" (30 December 2013), online: US EIA <<http://www.eia.gov/countries/analysisbriefs/Nigeria/nigeria.pdf>> (accessed 11 February 2015).

⁴⁴ *Ibid.*

⁴⁵ "The NNPC oversees the regulation of the oil and gas industries, with secondary responsibilities for upstream and downstream developments": United States Energy Information Administration, *supra* note 25.

⁴⁶ Nigerian National Petroleum Corporation, *History of the Nigerian Petroleum Industry*, online: NNPC <http://www.nnpcgroup.com/NNPCBusiness/BusinessInformation/OilGasInNigeria/IndustryHistory.aspx> (accessed 11 February 2015).

⁴⁷ Nnena Ezeah, "Nigeria's Crude Production Peaks at about 2.68M bpd", *The Vanguard* (27 February 2012) online: Vanguard News: <<http://www.vanguardngr.com/2012/02/nigerias-crude-production-peaks-at-about-2-68m-bpd/>> (accessed 8 February 2015).

⁴⁸ Vanguard, "Nigeria's oil reserves drops to 35 billion barrels" *The Vanguard* (19 March 2014) online: Vanguard News: <<http://www.vanguardngr.com/2014/03/nigeria-oil-reserve-drops-35-bn-barrels/>> (accessed 8 February 2015).

⁴⁹ SO Oyedepo, *supra* note 30 at 87.

⁵⁰ *Ibid.*

almost 70% of gas consumed to operate electricity generating gas plants in the country.⁵¹ The consumption rate of petroleum product in Nigeria increased monumentally between 1990 and 2004 with motor gasoline and diesel oil taking an exceptional lead.⁵² For over three decades; the consumption rate of petroleum products stood between 80% and 90% of the entire commercial domestic energy consumption.⁵³

Nigeria is also blessed with abundant renewable potential energy resources such as solar, wind, hydroelectric, biomass, and tidal.⁵⁴ Nigeria enjoys ample solar resources that can be gainfully utilized with a yearly average daily radiation of about 5.25KW h/m²/day. The average amount of sunshine hours in the entire country is approximately 6.5h.⁵⁵ Therefore, over the course of a year, an average of 6,372,613 PJ/year of solar energy falls on the entire Nigerian land area.⁵⁶ Nigeria also has enormous wind energy generation resources. A statistical wind speed data analysis of 30 stations indicates that the annual mean wind speeds and power flux densities vary from 1.5 to 4.1 m/s and 5.7 to 22.5 W/m², respectively.⁵⁷ Wind energy generation capacity in Nigeria is estimated at 150,000 Terra Joule per year and biomass at 144 million tonnes per year.⁵⁸ The total hydroelectric energy potential of the country is approximately 14,750 Megawatts⁵⁹ with a yearly electricity generation capacity in excess of 36,000 GW. Also, Nigeria is capable of producing 6.8 million m³ of biogas everyday based on the daily production of about 227,500 tonnes of fresh animal wastes and annual generation of 20kg of municipal wastes per capital.⁶⁰

⁵¹ *Ibid.*

⁵² *Ibid.*

⁵³ Note that the growth rate over the period averaged about 22% with gasoline 28%, kerosene 19%, and diesel 18%. Diesel and gasoline are majorly used in the transportation sector which accounts for 87%. See OI Okoro and E Chikuni, "Power Sector Reforms in Nigeria: Opportunities and Challenges" 18:3 *Journal of Energy in Southern Africa* 52-57.

⁵⁴ SO Oyedepo, *supra* note 30 at 2.

⁵⁵ TC Chineke and EC Igwiro, "Urban and Rural Electrification: Enhancing the Energy Sector in Nigeria using Photovoltaic Technology" (2008) 9:1 *African Journal of Science and Technology* 102-108. Practically speaking, the enormous solar energy resources could power the whole of Nigeria.

⁵⁶ *Ibid.* Practically speaking, the enormous wind energy resources could power the whole of Nigeria.

⁵⁷ LO Adekoya and AA Adewale, "Wind Energy Potential of Nigeria" (1992) 2:1 *Renewable Energy* 35-39.

⁵⁸ Akin Iwayemi, "Nigeria's Dual Energy Problems: Policy Issues and Challenges" (2008) *International Association for Energy Economics* 17.

⁵⁹ *Ibid.*

⁶⁰ JFK Akinbami, *et al.*, "Biogas Energy Use in Nigeria: Current Status, Future Prospects and Policy Implications" (2001) 5 *Renewable and Sustainable Energy Review* 97-112.

These renewable resources, however, are largely left unexploited and their viability unrealized. For example, the country has exploited only 20-28% of its entire hydropower capacity,⁶¹ the total 5.5KW-hr/m²/day of solar radiation is not utilized, and wind energy resources remain unexploited.⁶²

2.2.B. Nigerian Energy Policy: An Implementation Challenge

In 1978, General Olusegun Obasanjo, then military head of state of Nigeria, in his foreword to the proceedings of the Energy Policy Conference, declared as follows: “Energy, in all its ramifications, has finally emerged in our consciousness as a crucial element in this unavoidable industrialization and socio-economic development process.”⁶³

Close to 10 years later, in 1987, a final version of the first Policy Guidelines on Energy for Nigeria, entitled, Policy Guidelines on Energy for Nigeria,⁶⁴ 1987 was presented. The policy had as its primary goal, the achievement of a suitable mix in the development of Nigeria’s energy resources in an environmentally acceptable manner that would ensure energy security and national self-sufficiency.⁶⁵ The National Policy Guidelines were aimed at providing an organized framework for the implementation of energy policy matters and led to the establishment of the Energy Commission of Nigeria (ECN).⁶⁶ The government also set up the Centre for Energy Research and Development at the Obafemi Awolowo University, Ile-Ife, and Centre for Energy

⁶¹ JFK Akinbami, “Renewable Energy Resources and Technologies in Nigeria: Present situation, Future Prospects and Policy Framework” (2001) 6 Mitigation and Adaptation Strategies for Global Change 155-181; Oluseyi O Ajayi and Kolawole O Ajanaku, “Nigeria’s Energy Challenge and Power Development: The Way Forward” (2009) 20:3 Energy and Environment.

⁶² Oluseyi O Ajayi and Kolawole O Ajanaku, “Nigeria’s Energy Challenge and Power Development: The Way Forward” (2009) 20:3 Energy and Environment.

⁶³ The objectives of the Guidelines include the development and maintenance of a regular inventory of the energy resources in Nigeria. Also, it aims at ensuring continuity and self-sufficiency in energy supply in the short, medium, and long-term at suitable costs. See Sunday Michael Agba, “Energy Poverty and the Leadership Question in Nigeria: An overview and Implication for the Future” (2011) 3:2 Journal of Public Administration and Policy Research 48-51.

⁶⁴ Note that Policy Guidelines on Energy for Nigeria, 1987 was the final version of the Draft Energy Policy Guideline produced by the Federal Ministry of Science and Technology in 1984.

⁶⁵ Sunday Michael Agba, *supra* note 63; Act No. 62 of 1979, as amended by Act No. 32 of 1988 and Act No. 19 of 1989.

⁶⁶ The ECN was established by Act No. 62 of 1979, as amended by Act No. 32 of 1988 and Act No. 19 of 1989, with the statutory mandate for the strategic planning and co-ordination of National Policies in the field of energy in all its ramifications. See Energy Commission of Nigeria, “About ECN” online: Energy Commission of Nigeria <http://www.energy.gov.ng/index.php?option=com_content&view=article&id=48&Itemid=53> (accessed 17 February 2015).

Research and Training (CERT) at the Ahmadu Bello University, Zaria under the auspices of the Nigeria Atomic Energy Commission (NAEC).⁶⁷

The National Energy Policy of 2003 (“NEP, 2003”) ⁶⁸ outlined plan to diversify the energy sector and pursue renewable energy development. ⁶⁹ The energy policy objectives and implementation strategies were been carefully modelled on the proposition that energy is crucial to national development goals and that government has a primary role in addressing the national energy challenges.⁷⁰ Further, NEP, 2003 targeted a reduction in the nation’s overdependence on oil by promoting aggressive research, development and demonstration, diversification of the nation’s energy resources, human resources development.⁷¹ Yet, the energy policy endorsed an increase in the utilization of oil, natural gas, coal, tar sands, along with nuclear, hydropower, biomass, solar, wind, and other renewable energy resources.⁷² The central theme of NEP, 2003 is the optimal utilization of the nation’s energy resources for sustainable development⁷³ and recognizes renewable energy as one of the sub-sectors of the nation’s energy sector.⁷⁴

Energy development and utilization is dynamic, however, and since NEP, 2003,⁷⁵ several changes have occurred in the national and global arenas necessitating its review.⁷⁶ For example,

⁶⁷ The Nigeria Atomic Energy Commission (NAEC) Act was enacted in 1976 and the two university based energy research and training centers were established in 1978. See Nathaniel Lowbeer-Lewis, “Nigeria and Nuclear Energy: Plans and Prospects” in *Nuclear Energy Futures Paper* (Waterloo: The Centre for International Governance Innovation, 2010).

⁶⁸ Energy Commission of Nigeria, *National Energy Policy* (Abuja: Federal Republic of Nigeria, 2003), online: http://wacee.net/getattachment/21cca4e4-ef1b-4c59-8501-98b3e8624b88/National_Energy_Policy_Nigeria.pdf.aspx (2003 National Energy Policy); Note that the National Energy Policy, 2003 was revised in 2013, discussed further in associated text.

⁶⁹ *Ibid.* at iv-v; See also discussion in Julia Kennedy-Darling, “The Energy Crisis of Nigeria: An Overview and Implications for the Future” (2008) 6:3 The University of Chicago 9.

⁷⁰ *Ibid.* at 1-2; See also discussion in Muhammed Tawfiq Ladan, “Policy, Legislative and Regulatory Challenges in Promoting Efficient and Renewable Energy for Sustainable Development and Climate Change Mitigation in Nigeria” (Paper delivered at the 3rd Symposium and 2nd Scientific Conference of ASSELLAU, University of Nairobi, Kenya, 23-25 March 2009) 15.

⁷¹ Energy Commission of Nigeria, *supra* note 68 at 5: “Over-dependence on oil has slowed down the development of alternative fuels. Diversification to achieve a wider energy supply mix will ensure greater energy security for the nation. The domestic demand for petroleum products is growing rapidly. The development of alternative fuels from locally available energy resources should therefore be vigorously pursued.”

⁷² *Ibid.*; Note however, that the energy policy only advocates a reduction in the use of fuel wood; *Ibid.* at 5, 19, 20, 25-27; For further discussion see Julia Kennedy-Darling, *supra* note 69.

⁷³ Energy Commission of Nigeria, *supra* note 68 at iv, 1 and 8.

⁷⁴ *Ibid.* at Chapter 3.

⁷⁵ *Ibid.*

the electricity sector achieved a considerable level of deregulation and liberalization with a view to attracting more investors to the energy industry. Also, significant global attention is being given to the development of renewable energy and energy efficiency for the promotion of sustainable development.⁷⁷ Therefore, new observations, contributions and recommendations by various stakeholders were incorporated into NEP, 2003 to produce the 2013 National Energy Policy (NEP, 2013).⁷⁸ The draft revised NEP, 2013 emphasizes active participation of the private sector in the development of the energy sector in a sustainable manner.⁷⁹ It has thirteen chapters: Chapter 1: Introduction; Chapter 2: Petroleum Policy; Chapter 3: Coal and Tar Sand Policy; Chapter 4: Nuclear Policy; Chapter 5: Renewable Energy Policy; Chapter 6: Bio-Energy Policy; Chapter 7: Electricity Policy; Chapter 8: Energy Utilization Policy; Chapter 9: Energy Efficiency and Conservation Policy; Chapter 10: Environment and Climate Change Policy;⁸⁰ Chapter 11: Policy on Other Energy Issues; Chapter 12: Energy Financing Policy; Chapter 13: Planning and Implementation Policy. Similarly, each chapter of the revised National Energy Policy, 2013 contains policy statements, policy objectives and strategies as well as the short, medium and long-term implementation strategies.⁸¹

It is pertinent to note that the NEP 2013 still remains a draft policy.

The overall energy policy objectives under the draft revised NEP, 2013 can be summarized as follows:⁸²

⁷⁶ Energy Commission of Nigeria, *National Energy Policy (Draft Revised Edition)* (Abuja: Federal Republic of Nigeria, 2013) (2013 National Energy Policy) ECN Online: <http://wacee.net/getattachment/21cca4e4-ef1b-4c59-8501-98b3e8624b88/National_Energy_Policy_Nigeria.pdf.aspx> (Accessed 9 February 2016).

⁷⁷ *Ibid.*: The much anticipated reforms in the Nigerian petroleum sector which is under consideration through the Petroleum Industry Bill (PIB); the discovery of petroleum in commercial quantities by many neighbouring/African countries; and the exploration of shale oil and gas in major oil and gas consuming countries are further events that inspired the revision of the 2003 National Energy Policy.

⁷⁸ *Ibid.*

⁷⁹ *Ibid.*

⁸⁰ Chapter 10 focuses on the promotion of diversified energy resource options and adequate/reliable supply of energy for sustainable national development in an environmentally friendly manner. It also focuses on the promotion of diversified energy resources and the development of the country's renewable energy resources in order to enhance climate protection and energy security simultaneously which will help Nigeria move towards a low-carbon future.

⁸¹ Energy Commission of Nigeria, *supra* note 76.

⁸² *Ibid.*

- i. To ensure the development of the nation's energy resources, with diversified energy resource options, for the achievement of national energy security and an energy delivery system with an optimal energy resource mix.
- ii. To guarantee increased contribution of the energy sector to national income.
- iii. To guarantee adequate, sustainable and reliable supply of energy at appropriate costs and in an environmentally friendly, to the various sectors of the economy, for national development.
- iv. To guarantee an efficient and cost effective consumption pattern of energy resources.
- v. To accelerate the process of acquisition and diffusion of technology and managerial expertise in the energy sector and indigenous participation in energy sector industries, for stability and self-reliance.
- vi. To promote increased investments and development of the energy sector industries with private sector leadership.
- vii. To ensure a comprehensive, integrated and well-informed energy sector plans and programmes for effective development.
- viii. To foster international co-operation in energy trade and projects development in both African region and the world at large.
- ix. To successfully use the nation's abundant energy resources to promote international co-operation.
- x. To promote research and development in, and adoption of, sustainable low carbon and clean energy technologies to mitigate environmental pollution and climate change.
- xi. To promote gender sensitivity and special attention to rural energy needs.
- xii. To promote efficiency, conservation and carbon management best practices in the nation's energy supply chain.
- xiii. To ensure comprehensive, integrated and up-to-date availability of energy sector data and information.
- xiv. To ensure effective co-ordination of national energy planning, programmes and policy implementation.

First, it can be observed that NEP, 2013 policy objectives align well with the three broad themes of international climate change response identified in the previous chapter namely: mitigation;

cooperation; integration and uniformity. Second, as reflected in the objectives above, the draft NEP, 2013 provides a framework for sustainable energy development in Nigeria with the overall objective of providing clean, affordable, adequate and reliable energy with the active participation of the private sector.⁸³

Indeed, a coherent and comprehensive energy policy is essential in guiding a country towards effective utilization of its energy resources. And under NEP, 2013, the Energy Commission of Nigeria (ECN) remains the government body responsible for energy sector strategic planning, policy implementation and the co-ordination of activities.⁸⁴

However, the existence of an energy policy and coordinating authority, while vital, does not guarantee responsible management of a nation's energy resources.⁸⁵

In spite of the fact that the revised NEP, 2013 objectives encourage the promotion of both energy security and climate change objectives (for example, as reflected in items i, iii, x and xii above), the Nigerian government's continuing overdependence on oil⁸⁶ has slowed the development of alternative sources of energy, even though the need is glaring,⁸⁷ hence impeding the full implementation of NEP, 2013 objectives. The failure of government to prioritize energy security aspect of energy policy is evident in its reluctance to provide adequate funds for the development of the alternative energy sector.⁸⁸ Additionally, the interaction between the ECN and other relevant government agencies is very weak⁸⁹ further hampering the proper implementation of the

⁸³ *Ibid.*

⁸⁴ ECN is the government office in charge of energy sector planning and policy implementation. The commission also promotes the use of renewables and alternative energies within the electric generation mix in Nigeria. The ECN fulfils the role of for strategic overall planning, coordination and effective direction of Nigeria's national Energy strategies within Nigeria and with ECOWAS member states. See, Energy Commission of Nigeria, *supra* note 76.

⁸⁵ Temilade Sesan, "Status of Renewable Energy Policy and Implementation in Nigeria" (2008) Institute for Science and Society, Faculty of Social Sciences, Law and Education, University of Nottingham 5 (Sesan) online: <<http://www.gbengasesan.com/temidocs/REPStatusNigeria.pdf>> (accessed 29 June 2016).

⁸⁶ Simon Warikyei Amaduobogha, *supra* note 42; United States Energy Information Administration, *supra* note 43.

⁸⁷ Temilade Sesan, *supra* note 85; Julia Kennedy-Darling *supra* note 69.

⁸⁸ Sesan, *Ibid.*

⁸⁹ By various accounts, the power sector in Nigeria is in disarray. It suffers from neglect, mismanagement, corruption, severe underinvestment from the federal government and weakness in the interaction between the ECN and other relevant government agencies, see, Atle Midttun and Nina Witoszek, *Energy and Transport in Green Transition: Perspectives on Ecomodernity Routledge Studies in Sustainability* (New York: Routledge, 2015); Ikeme, J. "Nigeria's electric power sector reform: what should form the key objectives?" (20015) 33 Energy Policy 1213-1221.

energy policy objectives. The lack of funds and lack of cohesion between agencies, along with ongoing poor management of available resources has stifled innovation in the nation's energy sector.⁹⁰

In the face of an ongoing failure to implement energy policy, environmental, and in particular, climate change goals, although reflected in the NEP, 2013 objectives, will as with other aspects of the NEP policy, continue to remain unrealized.

2.2.C. Nigerian Energy Industry: An Infrastructure Challenge

In addition to implementation failures, there are enormous industry challenges which have engulfed Nigeria for more than two decades with commercial and industrial activities being largely responsible for the high incidence of poverty in the country.⁹¹ Indeed, the Nigerian energy industry is frequently described as one of the most inefficient in meeting the needs of its customers globally⁹² and nationally. This inefficiency is most glaringly evident in the ceaseless imbalance and inconstancy in the markets for electricity and petroleum products (especially diesel and kerosene).⁹³

Despite the enormous domestic endowments of renewable and non-renewable energy resources, the country experiences persistent and insufficient quantity, low access to energy and poor quality.⁹⁴ By the estimation of the Council for Renewable Energy of Nigeria (CREN), power outage brings about a loss of US\$ 984.38 million to Nigeria annually.⁹⁵ Incontrovertibly, expensive and unreliable power supply remains a grave concern to all sectors of the Nigerian economy; especially the industrial, domestic and commercial sectors.

⁹⁰ *Ibid.*; Citizens and businesses have thus begun to take the electricity supply into their own hands, spending an estimated US\$13.35 billion on diesel fuel annually. A further weakness of the Nigerian energy system is extensive flaring of gas. Also, it will take additional billions of dollars in additional revenue that the country badly requires to deal with various political, economic and social challenges. See, AN Anozie, "Evaluation of cooking energy cost, efficiency, impact on air pollution and policy in Nigeria." (2007) 32 Energy 1283-1290; FI Ibitoye, "Strategies for implementation of CO₂-mitigation options in Nigeria's energy sector" (1999) 63 Applied Energy 1-16.

⁷² SO Oyedepo, *supra* note 30 at 2.

⁹² Akin Iwayemi, *supra* note 58.

⁹³ *Ibid.*

⁹⁴ Akin Iwayemi, *supra* note 58.

⁹⁵ Council for Renewable Energy of Nigeria, "Nigeria Electricity Crunch" (2009) CREN online: <www.renewablenigeria.org> (accessed 11 February 2015).

Oil and gas has been a source of conflict in the Niger Delta region of Nigeria where local militants seeking a share of the wealth often attack the oil infrastructure and engage in oil theft by vandalizing oil and gas pipelines leading to loss of production, pollution, and companies are forced to shut down production.⁹⁶ It is also suggested that inequality, largely caused by oil extraction and dispossession has been the cause of the attacks on oil infrastructure. Aging infrastructure and poor maintenance have also resulted in oil spills exacerbating the petroleum products and electricity supply challenges and causing massive social and environmental damage.⁹⁷

Throughout the world, electricity is the most widely used and desirable form of energy. It is a fundamental requirement for effective industrialization, economic development and for an adequate standard of living.⁹⁸ However, in 2010, World Bank data revealed that electrification rates for Nigeria were 50% for the whole country as a whole – leaving approximately 80 million people in Nigeria without access to electricity.⁹⁹

As a country experiences population growth and economic expansion, its demand for energy increases. However, if this demand is not adequately met, a shortage in supply occurs, which is capable of assuming crisis proportions.¹⁰⁰ Electric power is inadequate in Nigeria.¹⁰¹ In spite of Nigeria's huge resource endowment and investment in the provision of energy infrastructure, the performance of the power sector has remained in an abysmal state, in comparison with other developing countries.¹⁰²

⁹⁶ United States Energy Information Administration, *supra* note 43.

⁹⁷ *Ibid.*

⁹⁸ SO Oyedepo, *supra* note 30 at 88.

⁹⁹ United States Energy Information Administration, *supra* note 43.

¹⁰⁰ TO Akinbulire, COA Awosope & PO Oluseyi, "Solving the technical problems facing electrical energy development in Nigeria" (Paper delivered at the 3rd Annual Conference Research and Fair of the University of Lagos, Nigeria, 3 December 2007).

¹⁰¹ NI Chigbue, "Reform of Electric Power Sector: Journey so Far" (Lecture delivered at the US Africa Collaboration Research Sponsored by the National Science Foundation in Abuja, Nigeria, 2006) 3.

¹⁰² PO Oluseyi, TO Akinbulire and COA Awosope, "Energy Efficiency in the Third World: The Demand-side Management (DSM Option)" (Paper delivered at the Conference Internationale des Energies Renouvelables, Hammamet, Tunisia, 4-6 November 2007).

Currently, the power industry in Nigeria is bedeviled by major difficulties in the principal areas of operation: generation, transmission, distribution and marketing.¹⁰³ These energy shortage challenges are multifaceted, with underlying causes that are structural, financial, and socio-political, all of which are not mutually exclusive.¹⁰⁴ The extreme electricity shortage has led to the large-scale substitution of poor public electricity supply with highly-polluting and extremely carbon-emitting self-generated power.¹⁰⁵ The scarcity of diesel has paralyzed industrial production dependent on diesel-generated private supply of electricity. Similarly, kerosene shortages combined with scarcity-induced high kerosene prices have led to the considerable use of fast depleting fuel-wood by the low and middle-income classes with adverse effects on the environment.¹⁰⁶

To be sure, the country's national energy resource/policy is currently mostly dependent on fossil fuels and firewood which are fast depleting.¹⁰⁷ Over-reliance on fossil fuels to generate electricity in different households and business enterprises¹⁰⁸ also exposes the environment to carbon emissions contributing to climate change. For example, natural gas flaring, the burning of associated natural gas that is produced with oil, has contributed to environmental pollution.¹⁰⁹ Unchecked gas flaring has consistently placed Nigeria among the world's largest carbon emitters.¹¹⁰

Notwithstanding the colossal amounts of public expenditure in the government dominated and controlled energy industry, Nigeria's chronic energy infrastructural gaps have existed since the mid-1970s and worsened in recent times.¹¹¹ The trillions of naira (billions of dollars) invested in capacity expansion in the energy industry contrast sharply with the extremely poor supply outcomes measured by refinery output, frequent power outages, voltage variation, and rise in

¹⁰³ KI Idigbe and SO Onohaebi, "Repositioning the Power Industry in Nigeria to Guarantee Reliability in Operation and Services" (2009) 4:2 Journal of Engineering and Applied Sciences 119-125.

¹⁰⁴ Julia Kennedy-Darling, *supra* note 69.

¹⁰⁵ Akin Iwayemi, *supra* note 58.

¹⁰⁶ *Ibid.*

⁸⁸ SO Oyedepo, *supra* note 30 at 16.

¹⁰⁸ *Ibid* at 2.

¹⁰⁹ United States Energy Information Administration, *supra* note 43.

¹¹⁰ "The persistent flaring of oil-associated gas is partly due to the reluctance of multinational oil companies to invest in the gas gathering facilities for domestic use. Another factor has been their willingness to pay the low penalties for gas flaring". See Akin Iwayemi, *supra* note 58.

¹¹¹ *Ibid.*

imported fuels.¹¹² Multiple and unpredictable power cuts have forced industrial enterprises to install their own electricity/energy generation and transmission equipment, hence adding significantly to their operating and capital costs.¹¹³ Nigeria has five domestic refineries owned by the government with capacity to process 450,000 barrels of oil per day, yet imports constitute more than 75% of petroleum products requirements. In the past two decades, the state owned refineries have hardly operated above 40% capacity utilization rate for any extended period of time.¹¹⁴ This factor illustrates why the government has embarked on large import volumes to remedy domestic shortages of the petroleum products.¹¹⁵

Also, Nigeria' electricity market is dominated on the supply side by the state-owned and controlled Power Holding Company of Nigeria (PHCN), formerly called the National Electric Power Authority (NEPA). This company has proven to be incapable of providing minimum acceptable global standards of electricity service accessibility, reliability and availability for the past three decades.¹¹⁶ However, in 1999, the government embarked on various reforms in the power sector which led to initiation of the National Integrated Power Project (NIPP) in 2004 and privatization of the power sector.¹¹⁷ On 30th September 2013, the president of Nigeria handed over share certificates and licenses to the purchasers of electricity generation and distribution companies.¹¹⁸ Despite the unbundling and privatization of PHCN in 2013, Nigeria's electricity generation capacity declined from the peak generation level of about 4,517.6 Megawatts recorded in December, 2012 to about 3,670 Megawatts in January, 2014.¹¹⁹

¹¹² *Ibid.*

¹¹³ K Uduma and T Arciszewski, "Sustainable Energy Development: The Key to a Stable Nigeria" (2010) 2 Sustainability 1558-1570.

¹¹⁴ Akin Iwayemi, *supra* note 58.

¹¹⁵ *Ibid.*

¹¹⁶ *Ibid.*

¹¹⁷ IseOlorunkanmi O Joseph, "Issues and Challenges in the Privatized Power Sector in Nigeria" (2014) 6:1 Journal of Sustainable Development Studies 161-174.

¹¹⁸ "This is a critical step forward for Nigeria, making more difference to the lives of ordinary people than any other in the past". See The Guardian, "Nigerian Power Breakthrough provides new hope for Millions" *The Guardian* (2 October 2013) online: The Guardian News: <<http://www.theguardian.com/global-development-professionals-network/adam-smith-international-partner-zone/nigerian-power-breakthrough-global-development>> (accessed 14 February 2015).

¹¹⁹ IseOlorunkanmi O Joseph, *supra* note 117 at 168.

Since the mid-1990s, dozens of governments have embarked on the pathway to deregulate and privatize the power sector.¹²⁰ Electricity deregulation and privatisation is “in essence a massive shift of ownership and control of electricity from public to private hands, in the name of economic efficiency and in the cause of private profits.”¹²¹ Privatization of the energy industry¹²² has become widely recognized and accepted amongst governments and policymakers despite the consequent price rises and disasters that have followed in its wake:¹²³ the government bailouts of electricity companies that have been necessary in California and Britain; the series of blackouts that have been experienced from California to Buenos Aires to Auckland; the fact that it has become too expensive for millions of people from India to South Africa;¹²⁴ the need for electricity rationing in Brazil.¹²⁵ Also, it has been argued that privatization of the energy industry/power sector is the primary cause of social and environmental degradation in Nigeria.¹²⁶

In the 1980s, the need to expand electrical infrastructure in developing countries and a shortage of local capital forced governments to borrow money from abroad in order to finance capital-intensive energy projects.¹²⁷ The inability of local consumers to provide high enough prices to pay off these loans made debts to build up, putting serious pressure on the economies of developing countries.¹²⁸ Accordingly, because of the high debt levels, the developing countries were encouraged to rely on foreign investment for the purpose of developing their own infrastructure.¹²⁹ Globally, the trend towards the private sector financing and construction of

¹²⁰ Sharon Beder, “Critique of the Global Project to Privatize and Marketize Energy”, *Envisioning a Renewable Public Energy System* (2005) Korean Labor Social Network on Energy 177-185.

¹²¹ *Ibid.*

¹²² Sharon Beder, *Power Play: The Fight to Control the World's Electricity* (Melbourne and New York: Scribe Publications and the New Press, 2003); Gregory Palast, “IMF's Four Steps to Damnation” *The Guardian* (29 April 2001) *The Guardian* online: <<https://www.theguardian.com/business/2001/apr/29/business.mbas>> (accessed 16 June 2016); Mark O'Neill, “Power Plant Sale Agreement Sparks Outcry from Workers” *South China Morning Post* (20 August 2001) 3.

¹²³ Sharon Beder, *supra* note 120.

¹²⁴ *Ibid.*

¹²⁵ Larry Rohter, “Electricity Rationing in Brazil Inflames Regional Animosity” *The New York Times* (4 November 2001) *The New York Times* online: <<http://www.nytimes.com/2001/11/04/world/electricity-rationing-in-brazil-inflames-regional-animosity.html>> (accessed 21 June 2016).

¹²⁶ See, John Olatunji Omotoso, “Transnational Oil Corporations’ Operations and Environmental Degradation in Nigeria, 1956-2010” (2013) 4:4.1 *Afro Asian Journal of Social Sciences* 1-22.

¹²⁷ Sharon Beder, *supra* note 120.

¹²⁸ *Ibid.*

¹²⁹ *Ibid.*

electricity generation keeps increasing.¹³⁰ To tackle its energy crisis, Nigeria has various options given its ample reserve of natural resources. One path would be to invest in more oil and gas exploration and utilize more of these sources for direct internal use.¹³¹ Long-term investments in renewable energies like solar and wind have the potential to significantly improve Nigeria's energy security and climate change objectives. However, "these technologies have high upfront costs."¹³² The theoretical framework of the energy policy outlined by the Nigerian government shows signs of future success, but there is a disconnection between theory and execution, exacerbated by the population's hostility toward privatization¹³³ due to lack of trust in government's policies and intentions.

It is my view that Nigeria needs enormous financial support in order to be able to carry out a structural reform of its energy industry and system and private investments are required to provide this financial support. However, an extensive and considerable change of the public's perception of the Nigerian government is pertinent to stimulate huge private investment in the country's power sector. Therefore, structural reform of the country's power sector could progress through increased transparency and education about government's policy objectives which may ease citizens' feeling of distrust in government.

It has also been argued that the privatization process is only one step on the way to an adequate supply of electricity in Nigeria – it is not an answer in itself. Much work over a number of years has been required to make the Nigerian power sector commercially viable and ready to receive private sector investment.¹³⁴ It is estimated that Nigeria will need around US\$70 billion investment in its energy industry in order to reach the equivalent level of electricity supply in

¹³⁰ *Ibid.*

¹³¹ J Ikeme, "Nigeria's electric power sector reform: what should form the key objectives?" (2005) 33 Energy Policy 1213-1221.

¹³² Julia Kennedy-Darling et al., "The Energy Crisis of Nigeria: An Overview and Implications for the Future" (2008) 6:3 The University of Chicago online: <<http://franke.uchicago.edu/bigproblems/Energy/BP-Energy-Nigeria.pdf>> (accessed 21 June 2016).

¹³³ *Ibid.*

¹³⁴ The Guardian, *supra* note 118.

Brazil and South Africa.¹³⁵ This is far beyond what the government can finance; and the Nigerian public sector has a woeful track record in managing smaller infrastructure programmes.¹³⁶

2.3. Nigerian Energy Industry Structure - Climate Change Nexus

2.3.A. Preliminary Considerations

As previously raised in Chapter One, scientific reports and research made available to policymakers have predicted that climate change will specifically have adverse impacts on the energy industry.¹³⁷ Climate change will significantly affect the energy industry in several ways.¹³⁸

In 2013, the United States Department of Energy established that changing climate trends are expected to continue to restrict the supply of secure, sustainable and affordable energy, which is critical to economic growth and development.¹³⁹ This is likely to happen when rising temperatures, irregular precipitation, rise in sea levels, among others, has an impact on energy infrastructure and the capacity to produce energy through hydro and thermal sources.¹⁴⁰ Similarly, severe drought will lead to higher evapo-transpiration that negatively affects water volume thereby reducing hydroelectric capacity.¹⁴¹ So for example, water flow problems linked to declining water volumes in the River Niger and its tributaries attributed to climate change have already severely undermined the performance of Nigeria's three hydro stations (Kainji, Jebba and Shiroro).¹⁴²

Further, extreme weather events (windstorms, floods, etc.) induced by climate change will aggravate the rate of failure of transmission system of electric utilities and other energy supply

¹³⁵ *Ibid.*

¹³⁶ *Ibid.*

¹³⁷ Schaeffer, *et al.*, "Energy Sector Vulnerability to Climate Change: A Review" (2011) Energy 38; JA Beecher and JA Kalmbach, Climate Change and Energy: *US National Climate Assessment Midwest Technical Input Report* (Washington, DC: National Climate Assessment-US Global Change Research Program, 2012).

¹³⁸ *Ibid.*

¹³⁹ US Department of Energy, *US Energy Sector Vulnerabilities to Climate Change and Extreme Weather* (Washington, DC: US Department of Energy, 2013).

¹⁴⁰ Opeyemi Akinyemi, Adeyemi Ogundipe and Philip Alege, "Energy Supply and Climate Change in Nigeria" (2014) 4:14 Journal of Environment and Earth Science 47-61.

¹⁴¹ *Ibid.*

¹⁴² Akin Iwayemi, *supra* note 58.

infrastructure critical to operations in the Nigerian energy industry.¹⁴³ Because Nigeria already struggles with significant service disruption, extreme weather events could effectively disable energy transmission and supply.¹⁴⁴

Because it is apparent that energy security is at the center of both the problem and solution to climate change,¹⁴⁵ the government of Nigeria should be compelled to overhaul the structure of the Nigerian energy industry in order to discover more effective ways of ensuring the security of its energy supply.

Indeed, the energy industry itself is regarded as the major contributor to the concentration of greenhouse gases in the atmosphere which is largely responsible for climate change; therefore, the energy industry has been the main target of policymakers as a means of confronting the adverse impacts of climate change.¹⁴⁶ Considering the goal of the government of Nigeria to increase electricity generation from the currently installed 6,500 Megawatts to 25,000 Megawatts by 2020,¹⁴⁷ it is imperative that the government formulate and implement policies that can advance energy security and climate change mitigation objectives through industry reform.

That said, according to JY Oricha and GA Olarinoye, problems influencing the energy sector in developing countries like Nigeria differ from the problems affecting the energy sector in developed countries and accordingly, climate change impacts will differ.¹⁴⁸ Thus it is important to also consider the patterns of energy consumption specific to the Nigerian experience.

2.3.B. Pattern of Energy Consumption in Nigeria

¹⁴³ *Ibid.*

¹⁴⁴ Building Nigeria's Response to Climate Change, "Climate Change Information on Nigeria" (2008) online: BNRCC <<http://www.nigeriaclimatechange.org/ccinfo.php>> (accessed 14 February 2015); James Greenleaf, *et al.*, Analysis of Impacts of Climate Change Policies on Energy Security: *Ecofys International Final Report* (Brussels: European Commission DG Environment, 2009) at 7.

¹⁴⁵ Opeyemi Akinyemi, Adeyemi Ogundipe and Philip Alege, *supra* note 140 at 49.

¹⁴⁶ *Ibid.*

¹⁴⁷ The government also promised to connect 75% of the population to the electric power grid from the current 40% by 2025. See H Gujba, Y Mulugetta & A Azapagic, "Environmental and Economic Appraisal of Power Generation Capacity Expansion Plan in Nigeria" (2010) 38 Energy Policy 5636-5652.

¹⁴⁸ JY Oricha and GA Olarinoye, "Analysis of Interrelated Factors affecting Efficiency and Stability of Power Supply in Nigeria" (2012) 2:1 International Journal of Energy Engineering 1-8.

In the world today, the pattern of energy consumption reveals that Nigeria and many African countries have the lowest rates of consumption though demand in Nigeria is expanding rapidly. However, rapidly increasing energy demand, typical of a developing economy, is a significant contributor to Nigeria's inadequate supply of usable energy.¹⁴⁹

Energy consumption patterns in Nigeria can be divided into transport, industrial, household, agricultural and commercial sectors.¹⁵⁰ As a result of the low level of development in the transport, industrial, agricultural and commercial sectors, the household sector accounts for the largest portion of energy usage which is about 65%.¹⁵¹ In Nigeria's households, the primary energy-consuming activities include lighting, use of electrical devices, and cooking. Cooking accounts for 91% of domestic energy consumption, 3% can be attributed to the use of electrical devices while lighting uses the remaining 3%.¹⁵² Electricity, oil, cooking gas, kerosene, charcoal and fuel wood are the principal energy resources for domestic and commercial utilization in Nigeria.¹⁵³ The majority of urban dwellers depend on kerosene for domestic cooking, while the minority of people rely on electric cookers and gas.¹⁵⁴

However, rural dwellers have little access to electricity and petroleum products. Due to bad road networks, petroleum products such as kerosene and gasoline are bought in the rural areas at very high prices in excess of their official pump prices.¹⁵⁵ Therefore, as earlier described, the rural population relies to a great extent on wood as a major source of energy. In fact, it is estimated that almost 86% of rural households in Nigeria depend on fuel wood as their source of energy.¹⁵⁶

¹⁴⁹ SO Oyedepo, *supra* note 30 at 4; ECN Okafor and CKA Joe-Uzuegbu, "Challenges to Development of Renewable Energy for Electric Power Sector in Nigeria" (2010) 2:2 International Journal of Academic Research 211-216.

¹⁵⁰ Energy Commission of Nigeria, *supra* note 68 and 76.

¹⁵¹ SO Oyedepo, *supra* note 30 at 4.

¹⁵² Energy Commission of Nigeria, *Renewable Energy Master Plan* (Abuja: Federal Republic of Nigeria, 2005).

¹⁵³ OO Famuyide, SE Anamayi & JM Usman, "Energy Resources' Pricing Policy and Its Implications on Forestry and Environmental Policy Implementation in Nigeria" (2011) 2:1 Continental Journal of Sustainable Development 7.

¹⁵⁴ SO Oyedepo, *supra* note 30 at 4.

¹⁵⁵ *Ibid.*

¹⁵⁶ CE Williams, "Reaching the African Female Farmers with Innovative Extensive Approaches: Success and Challenges for the Future" (Paper presented to the International Workshop on Women Agricultural Intensification and Household Food Security at the University of Cape Coast, Ghana, 25-28 June, 1998).

The imbalance in fuel wood supply/demand in some parts of the country is an actual threat to the energy security of the rural population.¹⁵⁷

Indeed, energy consumption per capita is very small in Nigeria, about one-sixth of the energy consumed in developed economies. This has an immediate connection with the level of poverty in the country.¹⁵⁸ It can thus be observed from the pattern of energy usage in Nigeria that in addition to addressing generally the overall absence of sustainable usage and the consumption pattern that is not climate-conscious, improving energy security from climate change impacts should also contemplate household usage. Also, the pattern of energy consumption in Nigeria is examined in order to instigate a discussion on the promotion of energy conservation measures and the development of modern/clean energy alternatives by taking into consideration the increasing population growth and the understanding that the available oil and gas resources are limited and exhaustible.

2.4. Chapter Observations

This chapter examines the structure of the Nigerian energy industry and it has done so by identifying the renewable and non-renewable energy resources present in Nigeria and then considering such resources from energy policy perspectives. It describes the poor management of energy resources and the extent to which the primary energy resources are being depleted without development of alternative energy resources. It appears that in practice, the Nigerian government is focused more on oil and gas exports (and revenue generated therefrom) than the environmental and climate change impacts of oil and gas production and consumption. This chapter describes that a continued over-reliance on oil and gas as well as a failure to move towards renewable energy alternatives, despite national energy policy initiatives that are moving in this direction, are linked with aging energy infrastructure, global political economy of oil and gas and the power of multinational corporations, lack of communication between government agencies, lack of funds, sabotage of energy infrastructure by militants, depletion of the national energy resources, and so forth.

¹⁵⁷ Energy Commission of Nigeria, *supra* note 68.

¹⁵⁸ SO Oyedepo, *supra* note 30 at 4.

The non-implementation of NEP, 2013 has impeded the promotion of energy security and climate change objectives in Nigeria. It is this author's view that NEP, 2013 if implemented, could respond to and address issues surrounding energy security and climate change concerns. Accordingly, the author suggests NEP, 2013 is the appropriate framework for advancing these dual goals.

Having now examined the essential features of the Nigerian energy industry and the challenges bedeviling it along with the pattern of energy consumption in Nigeria, we now turn to Chapter Three which explores in more detail, the concept and definitions of energy security globally and specific to the Nigerian legal system and policy framework. The overarching purpose of Chapter Three is to explore Nigeria's concept of energy security along with energy security policy objectives in order to present a first iteration of a revised definition of energy security relevant to the Nigerian context in the face of climate change risk.

CHAPTER THREE ENERGY SECURITY IN PERSPECTIVE

3.1. Introduction

Energy security has been at the heart of energy policy for more than a century,¹ but the term “energy security” first gained universal prominence forty years ago in the wake of the “First Oil Shock.”² In 1973, the foremost oil exporting countries assumed control over production, export and pricing of the oil from the European and producing American transnational oil companies which had controlled and managed the oil industry until that period. Six Persian Gulf oil producers voted to raise their benchmark oil price by 70 percent and over the next few months, the Arab members of the Organization of the Petroleum Exporting Countries (OPEC) cut production and halted oil shipment to the United States and other nations that were backing Israel in the Yom Kippur War.³ The oil embargo triggered a complex set of externalities including a critical imbalance in supply and demand eventually provoking “an upward spiral in oil prices with global implications.”⁴ By the time the embargo was lifted in March 1974, oil prices had stabilized at around \$12 a barrel - almost four times the pre-crisis price and the OPEC states enjoyed enormous windfalls and new geopolitical influence, whereas the United States and other oil importers were hit by unprecedented fuel costs and painful recessions.⁵

These events saw the emergence of the “energy security” concept, whereby there was international realization on just how essential energy was for almost all daily needs and functioning (including transportation, education, food production and health care) and as such,

¹ Daniel Yergin, *The Quest: Energy, Security, and the Remaking of the Modern World* (New York: Penguin Press, 2011).

² Hugh Saddler, “Energy Security/Insecurity and Climate Change in Australia” in *Mapping Causal Complexity in Climate Change Impacts and Adaptations* (Paper Delivered for the Nautilus Institute-RMIT Workshop Sponsored by the Nautilus Institute in Partnership with the RMIT University in Melbourne, Australia, 21 November 2008) 1.

³ Michael L. Ross, “How the 1973 Oil Embargo Saved the Planet” *Foreign Affairs* (October 15, 2013) online: <<https://www.foreignaffairs.com/articles/north-america/2013-10-15/how-1973-oil-embargo-saved-planet>> (accessed 14 February 2016).

⁴ US Department of the State, *Oil Embargo 1973-1974* (Office of the Historian); For further discussion of the “OPEC Oil Crisis” please see; MA Adelman, “OPEC At Thirty Years: What Have We Learned?” (1990) 15 *Annual Review of Energy* 1-22; Dimitri Aperjis, *The Oil Market in the 1980s: OPEC Oil Policy and Economic Development* (Cambridge, Mass.: Ballinger Pub., 1982); Hugh Saddler, *supra* note 2.

⁵ Michael L. Ross, *supra* note 3.

how energy security was absolutely necessary to social and economic stability.⁶ Considering that production and consumption for most energy carriers are separated by long distances and since energy cannot be effortlessly substituted or stored, energy security is a critical issue for both developed economies⁷ and developing countries. Energy security is the foundation upon which all developed world economies are built and it remains the resource pillar that holds up these industrialized nations.⁸ Thus energy access threats and supply instability was the catalyst for the emergence of the “energy security” concept, illuminating the importance of initiatives and strategies to stabilize energy resources from threats, including strategies aimed at energy conservation and the growth of domestic energy sources.

Recently, there has been renewed focus on energy security, in part prompted by an extremely tight oil market and unstable oil prices.⁹ This renewed interest, however, has also been stimulated by instability in some energy exporting nations, threats of terrorism, geopolitical rivalries, nationalist backlash, fears of a scramble for energy supplies, countries’ basic need for energy to power economic growth, revived apprehension over whether there will be sufficient resources to satisfy the global energy demands in times to come,¹⁰ crisis over Iran’s nuclear program, and substantial growth in China and India’s energy imports.¹¹ Furthermore, recent energy security concerns are not restricted to security of oil supply. Incidents of power outages in developed countries and severe shortages of electric power in developing countries have also escalated anxieties over the security and reliability of electricity supply systems¹² and other energy networks. Therefore, secure supplies of electricity and natural gas have also been of

⁶ Walter Leal Filho and Vlasios Voudouris, eds., *Global Energy Policy and Security* (England: Springer London Ltd, 2013).

⁷ Henryk Faas et al., “European Security – A European Perspective” in A Gheorghe and L Muresan, eds., *Energy Security: International and Local Issues* (Netherlands: Springer, 2011) 10.

⁸ A. Adisianya, “Nigeria’s Energy Security: Thinking Nuclear” *Saharareporters* (31 March 2014) online: Saharareporters News: <<http://saharareporters.com/article/nigeria-energy-security-thinking-nuclear>> (accessed 24 February 2015).

⁹ Daniel Yergin, “Ensuring Energy Security” (2006) 85:2 *Foreign Affairs* 69.

¹⁰ *Ibid* at 70.

¹¹ Pinar Ipek, “Azerbaijan’s Foreign Policy and Challenges for Energy Security” (2009) 63:2 *Middle East Journal* 227-239.

¹² Daniel Yergin, *supra* note 9 at 70.

growing importance for ensuring the smooth functioning of societies and economies.¹³ Yet, more than a third of the global population lacks access to electricity.¹⁴

Climate change threat, as discussed in Chapter One, is arguably the most recent and novel consideration informing energy security policy. With the development of climate change risk regulation, climate change has already begun to reshape global energy trends and stands poised to again reshape global and national concepts of energy security.¹⁵

As described in the previous chapter, energy insecurity is one of Nigeria's major challenges today¹⁶ and is considered to be largely responsible for the high rate of poverty in the country.¹⁷ Since all economic activities require energy to function effectively, Nigeria likely cannot achieve sustainable economic growth and unlock its full energy potential without first coming to a solution for its energy security problems.¹⁸ Climate change risk regulation, in my view, provides Nigeria with one solution. This chapter thus specifically explores the matter of energy security with a view to deconstructing energy security from the perspective of climate change risk regulation in order to articulate a new integrated definition of energy security for Nigeria.

The chapter first examines general concepts and definitions of energy security, exploring both global concepts and definitions (informal and formal) and concepts and definitions from – and most relevant to – Nigerian energy policy and law. The chapter then takes these together to summarize, at a level of abstraction, overarching objectives of energy security to propose a preliminary revised definition of energy security for Nigeria.

Building on the preceding chapters, the chapter then considers the definition of energy security in the context of climate change policy and regulation. Specifically, the preliminary revised definition of energy security is assessed to determine if it is sufficient for responding to climate

¹³ International Energy Agency, *Energy Supply Security 2014* (Paris, France: IEA Publications, 2014).

¹⁴ Henryk Faas et al., *supra* note 7.

¹⁵ International Energy Agency, *Energy Security and Climate Policy: Assessing Interactions* (Paris, France: IEA Publications, 2007) 3.

¹⁶ A. Adisianya, *supra* note 8.

¹⁷ SO Oyedepo, "Energy and sustainable development in Nigeria: the way forward" (2012) 2:15 *Energy, Sustainability and Society* 2. Online: <http://www.energysustainsoc.com/content/pdf/2192-0567-2-15.pdf> (accessed 6 February 2015).

¹⁸ A. Adisianya, *supra* note 8.

change risk. Finding that it is not (as will be discussed), a second revision to the definition – a preliminary “integrated” definition of energy security – is formulated through incorporation with the principal objectives of climate change risk regulation.

In addition to the foregoing, the chapter ends with some preliminary observations on the concept of energy security and the adequacy of the preliminary integrated definition of energy security for Nigeria is considered.

3.2. Defining Energy Security

3.2.A. Global Definitions and Concepts

3.2.A.i. The Varied Foci of Energy Security Definitions

Due to the intricate and complicated nature of the energy security concept, “energy security” does not have a globally adopted definition.¹⁹ Indeed, the concept of energy security is used in a wide range of documents and reports, frequently without explanation of its features and their importance.²⁰ And, perspectives on energy security differ largely between nations²¹ and presumably within different constituencies of nations and regions, etc.

For example, in the developed world, energy security is often defined as *the availability of sufficient energy supplies at affordable prices*.²² And, for energy-exporting nations, the emphasis is on *sustaining the security of demands for their energy exports*, which most importantly, generate varying amounts of government earnings.²³ In the developing world, the primary

¹⁹ Henryk Faas et al., *supra* note 7 at 9; AF Alhaji, “What Is Energy Security? Definitions and Concepts” (2008) 6:3 OGEL; Bert Kruyt, DP van Vuuren, HJM de Vries and H Groenenberg, “Indicators for energy security” (2009) 37 Energy Policy 2166 at 2167.

²⁰ *Ibid* at 10; Bert Kruyt, DP van Vuuren, HJM de Vries and H Groenenberg, *ibid* at 2166; Jessica Jewell, *The IEA Model of Short-term Energy Security (MOSES): Primary Energy Sources and Secondary Fuels* (Paris: International Energy Agency, 2011); B Sovacool and M Brown, “Competing Dimensions of Energy Security: An International Perspective” (2010) 35:1 Annual Review of Environment and Resources 77-108.

²¹ Daniel Yergin, *supra* note 9 at 70; AF Alhaji, *supra* note 19.

²² M Asif and T Muneer, “Energy supply, its demand and security issues for developed and emerging economies” (2007) 11 Renewable and Sustainable Energy Reviews 1388 at 1401; Caroline Kuzemko, *The Energy Security-Climate Nexus: Institutional Change in the UK and Beyond* (London: Palgrave Macmillan, 2013).

²³ Daniel Yergin, *supra* note 9 at 71.

concern is how their balance of payments is influenced by changes in energy prices.²⁴ For net energy-importing countries, the significance of the energy security concept ties primarily to the *diversification of energy suppliers*. Therefore, the energy security concept can be conceptualized from fairly straightforward *supply and demand* perspectives.²⁵ The concept of energy security can also be understood as *contextual* and capable of acquiring different interpretations under various *circumstances* and *state of affairs*. A *contextual* approach to defining energy security further recognizes that energy security is influenced by *international relations* and *different geo-political and economic settings*.²⁶

Australia's energy policy White Paper released by the Howard Government in June 2004 under the title *Securing Australia's Energy Future* (the "Australian White Paper") defines energy security as "ensuring that consumers have reliable, competitively priced supplies of energy."²⁷ This *competitive supply* perspective gives "policy primacy" to the search for further sources of energy supply with little apparent consideration of the long-term environmental impacts of such pursuits.²⁸ Thus the *competitive supply* definition increases the possibility of a failure to take into account environmental considerations, such as environmental damage that could result from energy production in environmentally sensitive areas and the environmental impacts of generating fuels from unconventional petroleum deposits such as shale oil and tar sands.²⁹

Similar to the Australian White Paper, the International Energy Agency (IEA) defines energy security as "the uninterrupted availability of energy sources at an affordable price."³⁰ However, within this *uninterrupted affordable supply* perspective of energy security, the IEA identifies both *short-term* and *long-term* aspects. *Short-term* energy security emphasizes the *capacity of the energy system to respond promptly to energy emergencies and sudden changes* within the supply-demand balance. *Long-term* energy security primarily borders on "timely investments to

²⁴ *Ibid*; Dilip Ahuja and Marika Tatsutani, "Sustainable energy for developing countries" (2009) 2:1 S.A.P.I.EN.S online: <http://sapiens.revues.org/823> (accessed 15 February 2016); Subhes C. Bhattacharyya, *Energy Economics: Concepts, Issues, Markets and Governance* (New York: Springer Science & Business Media, 2011).

²⁵ Jorrits Riens Oppewal, "Energy Security in Nigeria" (2011) Istituto Per Gli Studi Di Politica Internazionale 1, online: ISPI http://www.ispionline.it/it/documents/Analysis_86_2011.pdf (accessed 25 February 2015).

²⁶ RC Okeke, EMC Izueke and FI Nzekwe, "Energy Security and Sustainable Development in Nigeria" (2014) 4:3 *Arabian Journal of Business and Management Review*.

²⁷ Hugh Saddler, *supra* note 2 at 2.

²⁸ *Ibid*.

²⁹ *Ibid*.

³⁰ International Energy Agency, *supra* note 13 at 13.

supply energy in line with economic developments and sustainable environmental needs.”³¹ Arguably, the *long-term supply* concept of energy security is better poised to accommodate interruption from environmental and in turn climate change impacts.

Energy security has also been viewed from the perspective of *accommodation of supply interruption* i.e. the ability of businesses and households to accommodate disruptions and interruptions of supplies in energy markets at the micro-economic level.³² Marcus DuBois King and Jay Gulledge find this definition of being “typical of the economics literature which emphasizes energy supply over other elements of energy security.”³³

From a macro-economic level, it has also been observed that energy security concepts acknowledge that various interest groups, governments, individuals and corporations demonstrate *diversity and adaptation* in the ways in which they exploit and interpret their respective energy security policies and approaches, beyond immediate *supply interruption accommodation*.³⁴ For India and China, for example, energy security rests on *flexibility* and the *capacity to promptly adapt* to current reliance on the global energy markets, which marks a considerable movement from their previous commitments to *energy independence*.³⁵ Thus, any reliable evaluation of the concept of energy security requires equal consideration of the concept of *energy insecurity*.³⁶ Furthermore, the notion of *energy insecurity* is not entirely dissimilar to energy security from a *long-term supply* perspective, which in turn provides better opportunity for environmental and climate change considerations, particularly given that global energy markets are sensitive to environmental events and regulatory obligations.

Within the European Union, the energy security discourse has grown in scope and ambition as a result of the recent events on the global arena.³⁷ The depletion of conventional energy sources in the North Sea, unstable energy prices, uncompetitive energy markets, concerns over climate

³¹ *Ibid.*

³² See Michael Toman, “The Economics of Energy Security” in AV Kneese and JL Sweeney, eds., *Handbook of Natural Resource and Energy Economics* (Amsterdam: Elsevier B.V./North Holland, 1993).

³³ Marcus DuBois King and Jay Gulledge, “Climate Change and Energy Security Nexus” (2013) 37:2 The Fletcher Forum of World Affairs 28.

³⁴ A. Loeschel et al., “Energy security-concepts and indicators” (2010) 38 Energy Policy 1607-1608.

³⁵ Daniel Yergin, *supra* note 9 at 71.

³⁶ Henryk Faas et al., *supra* note 7 at 10.

³⁷ Maros Sefcovic et al., “The Energy Security Strategy in Europe” in Laurent Ulmann, ed., *The European Files* (Brussels: The European Files Publication, 2014).

change,³⁸ and the crisis in Ukraine (a major channel for Russian gas supplies to its main customer – the European Union), have emphasized the need for Europe to develop an energy security policy.³⁹ In line with the 2030 Energy and Climate Framework, the European Commission adopted a detailed “European Energy Security Strategy” (the “Energy Security Strategy”) which was endorsed by the European Council.⁴⁰

In consideration of the EU Member States’ *energy dependence*, the Energy Security Strategy recognizes *short-term* plans and identifies the problems that must be successfully addressed in the *medium-term* to *long-term*. Therefore, nuclear power will remain at the core of the EU’s energy mix in order to ensure that greater attention is given to internal energy production.⁴¹ Certainly, renewable energy generation sources will remain the highlight of the European energy security project. Further, the Strategy recognizes that a *diversified energy mix*, coupled with *optimized energy efficiency*, is central to *mitigating energy dependency* in Europe.⁴² Pursuant to the Strategy, the EU executive proposed radical and ambitious plans to establish a single European market in energy supplies, purchases and consumption in an attempt to loosen Russia’s stranglehold on Europe’s gas supplies with a view to strengthening energy security in Europe.⁴³ Also, the EU executive made proposals for a European energy union and an integrated energy supply systems regionally and on an EU-wide scale.⁴⁴ Energy security in the EU is overall described in terms of *sustainability*, *security* and *supply competitiveness*.⁴⁵ The European Council has defined energy security as the capacity to guarantee the availability of future energy needs through *sufficient domestic energy resources* produced under economic conditions that are

³⁸ Emil Kirchner and Berk Can, “European Energy Security Co-operation: Between Amity and Enmity” (2010) 48:4 Journal of Common Market Studies 859-880.

³⁹ Maros Sefcovic et al., *supra* note 37.

⁴⁰ European Parliament, *European Energy Security Strategy* (Brussels: European Commission, 2015) online: <<http://www.europarl.europa.eu/EPRS/EPRS-AaG-559474-European-Energy-Security-Strategy-FINAL.pdf>> (accessed 22 February 2016); *Ibid.*

⁴¹ *Ibid.*

⁴² *Ibid.*

⁴³ Ian Traynor and Arthur Neslen, “Ambitious EU Blueprint for Energy Union to loosen Russian grip on Gas” *The Guardian* (24 February 2015) online: The Guardian: <<http://www.theguardian.com/world/2015/feb/24/eu-blueprint-energy-union-russian-gas-gazprom-maros-sefcovic>> (accessed 27 February 2015).

⁴⁴ *Ibid.*

⁴⁵ Thomas Spencer et al., “Linking an EU Emission Reduction Target Beyond 20% to Energy Security in Central and Eastern Europe” (2011) The Finnish Institute of International Affairs online: <<http://www.fiia.fi/assets/publications/wp69.pdf>> (accessed 30 June 2016).

decent and acceptable or kept as “*strategic reserves* and by calling upon *accessible and stable external sources*” supplemented where suitable by “*strategic stocks*” [emphasis added].⁴⁶

Accordingly, in order to accomplish energy security from the EU perspective, both short-term and long-term views must be taken which mandates not only *competitive* and *accessible* supply, but also *sustainability* and *independence* which points to *diversification* of the domestic mix and *efficiency optimization*.

3.2.A.ii. Organizing Energy Security Definitions

A different approach to articulating the notion of energy security has been to categorize security concerns or responses that emerge from definitions. So for example, as described by C Winzer, definitions of energy security can be distinguished in accordance with the following (the “Winzer Model”):⁴⁷

1. sources of risk;
2. scope of the impacts, and
3. severity of impacts (in the form of the speed, size, sustention, spread, singularity and sureness).

From the Winzer Model, one can observe that the definitional content of energy security described in the foregoing section predominantly focuses on *impacts* and *responses* to those impacts (*responses to impacts* not included in the Winzer model). So for example, applying the Winzer Model to the concept of energy security in the context of oil supply as articulated by R Mabro, we see a focus on scope of impact and to a certain extent, the severity of impact: energy

⁴⁶ Gawdat Baghat, “Europe’s Energy Security: Challenges and Opportunities” (2006) 82:5 International Affairs 961-975.

⁴⁷ Christian Winzer, “Conceptualizing Energy Security” in *Electricity Policy Research Working Paper Group* (Cambridge: University of Cambridge, 2011) 1. The Winzer model was chosen because it is recent and canvassed by a number of sources. Also, the Winzer model was chosen because the aim of the writer is twofold. Firstly, they provide a descriptive overview of the conceptual landscape. Such an overview can be used in order to locate different studies in the wider context. This can facilitate the communication between authors from different fields. It can also help to ensure that there are no unintentional gaps in any particular analysis. And secondly, they want to suggest a set of conceptual boundaries that reduce the overlap between the policy goals of energy security, sustainability and economic efficiency. Their principal intention for these boundaries is to make sure the concept of energy security remains operational so that it can be measured and traded-off against the other policy targets.

security “is impaired when supplies are reduced or interrupted in some places to an extent that causes a sudden, significant and sustained increase in prevailing prices.”⁴⁸

In the United States of America (USA), the focus of energy security has also conventionally been on *impacts* and *responses to impacts* and the reduction of *susceptibility to political extortion*; this has motivated politicians to clamour for *energy independence* and increase the nation’s renewable energy generation capacities.⁴⁹

Another dimension to energy security in the USA however incorporates risk and impacts at a higher level of classification to describe a systems level strategy: the conceptualization of energy security as *resilience*.⁵⁰ MH Brown, C Rewey and T Gagliano describe the *resilient energy system* (the “Resilience Model”) as follows:

This resilient system would be capable of withstanding threats through a combination of active, direct security measures – such as surveillance and guards – and passive or more indirect measures – such as redundancy, duplication of critical equipment, diversity in fuel, other sources of energy, and reliance on less vulnerable infrastructure.⁵¹

This Resilience Model thus involves contemplation of risk/threats (though appearing to be non-specific as to source of risk/threats) and responses to risk/threats (though appearing to be non-specific as to impacts and scope of impacts). In its contemplation of responses to impacts, the Resilience Model includes *critical energy infrastructure* which matters to state policymakers owing to the fact that insecurity of energy supplies could have highly *destructive impacts* on “the economy, public health and safety, and the environment”. Accordingly, implicit in the *Resilience*

⁴⁸ Robert Mabro, “On the Security of Oil Supplies, Oil Weapons, Oil Nationalism and all that” (2008) 32:1 OPEC Energy Review 1-12.

⁴⁹ *Ibid* at 2.

⁵⁰ Matthew H Brown, Christie Rewey & Troy Gagliano, *Energy Security* (Washington, DC: National Conference of State Legislatures, 2003) 7. The Brown Resilience model was chosen because every nation’s energy system is a complex, interconnected web in which a disruption in one part of the infrastructure can easily cause disruptions elsewhere in the system. For example, after September 11, 2001, many policymakers and industry experts focused attention on the system’s vulnerability to intentional attack, accident or natural disaster. Now, energy security has become an important consideration for the international community. Further, it is pertinent to note that *energy security* affects all facets of the energy policy environment; therefore it is important for individuals and policymakers who focus on seemingly unrelated aspects of energy policy to also understand the overlapping dimensions of these issues.

⁵¹ *Ibid*.

Model of energy security is an evaluation of *scope* and possible *severity of impacts* as identified in the Winzer model.⁵²

In the Japanese experience, the concept of energy security explicitly focuses on the *severity of impacts* and responses whereby energy security means *counteracting severe shortages* of domestic energy resources “through diversification, trade, and investment.”⁵³ For Russia on the other hand, *impacts* seem to have lesser importance. The objective of Russia’s energy security is to uphold and maintain the *control of the state over key energy resources* and secure primacy over the critical energy infrastructure “and market channels through which it ships its hydrocarbons to international markets.”⁵⁴ This Russian definition is not readily/commonly understood against the risk-impact perspective (i.e. Winzer Model), nor from the systems perspective of the *resilience*, although it does point to *energy independence* which may have a causal effect on *diversification* which is also driven by policy aimed at *long-term/sustainability* objectives.

D Bohi, M Toman and M Walls conceptualize energy security as a Welfare Model and thus focus on *energy insecurity* and *impact on the economy* to define energy insecurity as “the *loss of welfare* that may occur as a result of a change in the price or availability of energy” [emphasis added].⁵⁵ Similarly, Grubb, Butler and Twomey recognize the disruptive effects of *energy insecurity* on the economy in their definition of energy security “as a system’s ability to provide a flow of energy to meet demand in an economy in a manner and price that does not disrupt the course of the economy”.⁵⁶ We can also observe here how the *energy insecurity* perspective of energy security points to *long-term* and *sustainable* supply considerations along with the notions of system *resilience*.

Notwithstanding the Winzer Model that identifies sources of risk/threats and impacts as the common considerations behind the various definitions of energy security which Winzer sums up

⁵² *Ibid* at 8.

⁵³ Daniel Yergin, *supra* note 9 at 71.

⁵⁴ *Ibid*.

⁵⁵ Douglas R Bohi, Michael A Toman and Margaret A Walls, *The Economics of Energy Security* (Boston: Kluwer Academic Publishers, 1996).

⁵⁶ M Grubb, M Butler and L Twomey, “Diversity and Security in UK Electricity Generation: the influence of low-carbon objectives” (2006) 34 *Energy Policy* 4050-4062.

as, “the absence of, protection from or adaptability to threats that are caused by or have an impact on the energy supply chain”,⁵⁷ Winzer ultimately defines “energy security as the continuity of energy supplies relative to demand”.⁵⁸ So despite the fact that risk could arise from numerous varied sources and that impacts could be experienced across a lengthy and diverse spectrum, energy security ultimately boils down to the practical matter of ensuring supply outweighs demand. Through this lens, it seems doubtful whether environmental or climate change risk regulation could have a role to play in achieving energy security, particularly given that concerns for the environment have historically yielded to energy supply.⁵⁹

On the other hand, it is evident that there are numerous *threats* (observed or potential) that could disrupt energy security (security of energy supply).⁶⁰ Therefore, under Winzer’s concept, the production and consumption of energy itself can be a *threat* with *impacts*, which would include *generating impacts* that could negatively affect energy supply in terms of environmental sustainability⁶¹ (which could include climate stability). Thus, even from a basic organizing theme of *risk and impact* directed to the objective of balancing *supply and demand*, the impacts of energy supply on the environment has to a certain extent been identified as feature of energy security.⁶² (Then again, note that the Winzer Model and definition of energy security arguably runs more along the lines of measurement and therefore does not seem to as strongly implicate *long-term* considerations nor *energy infrastructure* or *systems-level strategy* that emerges from the notion of energy security as *resilience*.)

The Center for Strategic and International Studies (CSIS) at the World Resources Institute moves beyond the binary approaches like *risk and impacts* and *supply and demand* to contribute to a more nuanced energy security model by identifying eleven (11) factors which contribute to “energy security”. These factors are: *energy intensity; affordability; diversity of energy suppliers;*

⁵⁷ Christian Winzer, *supra* note 47 at 9.

⁵⁸ *Ibid*: Note Winzer uses a using a stylized case study from three European countries to arrive at this definition.

⁵⁹ Anthony Giddens, *The Politics of Climate Change* (Cambridge: Polity, 2011); 11 SO Oyedepo, “Energy and sustainable development in Nigeria: the way forward” (2012) 2:15 Energy, Sustainability and Society 1 [Online]: <http://www.energysustainsoc.com/content/pdf/2192-0567-2-15.pdf> (accessed 6 February 2015); Opeyemi Akinyemi, Adeyemi Ogundipe and Philip Alege, “Energy Supply and Climate Change in Nigeria” (2014) 4:14 Journal of Environment and Earth Science 47-61.

⁶⁰ E Gnansounou, “Assessing the energy vulnerability: case of industrialized countries” (2008) 36:10 Energy Policy 3734-3744.

⁶¹ Christian Winzer, *supra* note 47 at 11.

⁶² B Kruyt et al., “Indicators for Energy Security” (2009) 37:6 Energy Policy 2166-2181.

*import levels; diversity of energy sources; security of trade flows; economics and geopolitics; risk of nuclear proliferation; reliability; feasibility; import levels; and market or price volatility.*⁶³

The list above includes more than just consideration of risks and impacts and it also goes beyond supply and demand considerations because it does identify the risk of nuclear proliferation and geopolitics in the course of offering a more detailed concept of energy security.

Further, although environmental considerations are not immediately referred to, they are to a certain extent implicitly contemplated in the following factors: reliability, diversity of energy sources, and risk of nuclear proliferation. However, given that the effects of energy supply on the environment and vice versa have been identified as important features of energy security (as discussed above), this particular formulation, though more expansive than other formulations of energy security, appears to focus more on short-term supply concerns rather than long-term strategy because the failure of the formulation to include environmental considerations and as such is regarded by the author as a shortcoming despite its apparent broader approach.

The Center for a New American Security (CNAS) expressly incorporates environmental considerations to define energy security as maintaining energy supplies that are “*geopolitically reliable, environmentally sustainable, and physically secure*”.⁶⁴ This CNAS definition expressly recognizes environmental protection and climate security perspectives on energy security.

⁶³ P Ekins, M Winskel and J Skea, “Putting it all Together: Implications for Policy and Action” in P Ekins, M Winskel and J Skea, eds., *Energy 2050: Making the Transition to a Secure Low Carbon Energy System* (London: Earthscan, 2011); Britt Childs Staley et al., *Evaluating the Energy Security Implications of a Carbon-Constrained U.S. Economy* (Washington DC.: Center for Strategic and International Studies). The CSIS is a bipartisan, non-profit organization headquartered in Washington, D.C. The Center’s 220 full-time staff and large network of affiliated scholars conduct research and analysis and develop policy initiatives that look to the future and anticipate change. For over 50 years, the CSIS has developed practical solutions to the world’s greatest challenges and continue to provide strategic insights and bipartisan policy solutions to help decision-makers chart a course toward a better world.

⁶⁴ Sharon Burke and Christine Parthemore, *A Strategy for American Power: Energy, Climate and National Security* (Washington, DC: Center for a New American Security, 2008) online: http://www.cnas.org/files/documents/publications/Burke_EnergyClimateNatlSecurity_June08.pdf.; CNAS is located in Washington, and was established in February 2007 by co-founders Dr. Kurt M. Campbell and Michèle A. Flournoy. The mission of the Center for a New American Security (CNAS) is to develop strong, pragmatic and principled national security and defense policies. Building on the expertise and experience of its staff and advisors, CNAS engages policymakers, experts and the public with innovative, fact-based research, ideas and analysis to

In an attempt to offer an inclusive definition of energy security, incorporating *long-term* and *short-term* considerations through the notion of *sustainability* (which has some parallels to the notion of *resilience*), the Asia Pacific Energy Research Center (APERC) defines energy security as follows:

the ability of an economy to guarantee the availability of energy resource supply in a sustainable and timely manner with the energy price being at a level that will not adversely affect the economic performance of the economy.⁶⁵

This definition then goes on to identify *physical energy security*, *economic energy security*, and *environmental sustainability* as the three basic components of energy security.⁶⁶ *Physical energy security* is “the availability and accessibility of supply resources” while *economic energy security* is “the affordability of resource acquisition and infrastructure development”.⁶⁷ The *environmental sustainability* component of energy security is the sustainable use of energy resources “that meets the needs of the present without compromising the ability of future generations to meet their own needs”.⁶⁸

What is particularly intriguing about the CNAS and APERC models immediately above, is that they demonstrate how the environmental sustainability lens readily incorporates many of the energy security objectives identified in different definitions and approaches earlier discussed. For example, the express inclusion of *environmental sustainability* as an element of energy security significantly broadens the concept of security of energy supply⁶⁹ to include the protection of the climate system through climate change mitigation measures. This approach addresses both short-term and long-term energy security goals by recognizing the interplay (or feedback loop)

shape and elevate the national security debate. A key part of its mission is to inform and prepare the national security leaders of today and tomorrow.

⁶⁵ Asia Pacific Energy Research Center, *A Quest for Energy Security in the 21st Century: Resources and Constraints* (Tokyo: Asia Pacific Energy Research Center, 2007) 6. The Asia Pacific Energy Research Centre (APERC) was established in July 1996 in Tokyo following the directive of APEC Economic Leaders in the Osaka Action Agenda. The primary objective of APERC is to conduct researches to foster understanding among APEC members of regional energy outlook, market developments and policy.

⁶⁶ *Ibid.*

⁶⁷ *Ibid.*

⁶⁸ *Ibid.*; See also SO Ladislav and J Nakano, *China - Leader or Laggard on the Path to a Secure, Low-Carbon Energy* (Washington DC: Center for Strategic and International Studies, 2011). Nakano and Ladislav incorporate sustainability, geopolitical and social acceptability factors into the definition of the concept of energy security.

⁶⁹ Winzer, *supra* note 47 at 6.

between energy security objectives and the environmental impacts of energy supply and further implicates *infrastructure* and *strategic system reform*. The notion of *sustainability* also arguably provides more opportunity to capture unknown threats and risk and furthermore embeds capacity for *flexibility* and *adaptation*, achieving a *resilience* (also implicating *diversification*) that may not be as easily achieved in the more prescriptive definitions of energy security.

3.2.B. Energy Security Specific to the Nigerian Context

3.2.B.i. Definitional Considerations

In 2014, R Okeke, E Izueke and F Nzekwe defined energy security as a situation in which the Nigerian nation and a greater number “or all of its citizens and businesses have access to sufficient energy resources at reasonable prices for the foreseeable future”, independent of severe risk of service disruption and interruption.⁷⁰

In this definition, we can see an energy security definition that is predominantly supply-focussed, ensuring supply outweighs domestic demand, incorporating concepts of: *energy insecurity*; *short-term supply*; *energy independence*; and *supply interruption accommodation*. Note, that this definition does not expressly incorporate the notion of *sustainability* which is essential to achieving energy security objectives in the *long-term* as just discussed. But as also previously described, energy security definitions and the areas of emphasis therein tend to reflect the particular energy challenges of a given country. Thus, the above Nigerian definition should not be surprising as the biggest energy security challenge in Nigeria continues to be an unreliable energy supply - a primary feature of the national energy crisis over the last ten years⁷¹ - with initiatives to date attempting to respond to demand in the *short-term* through established energy supply and infrastructure, particularly with respect to petroleum products and electricity supply.

Sole or over-reliance on a particular energy option has not achieved energy security in Nigeria.⁷² Environmental pollution and low refining capacity which requires Nigeria to import over 85% of its refined petroleum products continue to impede the achievement of reliable energy supply in

⁷⁰ RC Okeke, EMC Izueke and FI Nzekwe, *supra* note 26 at 65.

⁷¹ Energy Commission of Nigeria, *National Energy Policy (Draft Revised Edition)* (Abuja: Federal Republic of Nigeria, 2013) at 5.

⁷² Maren I Borok, Agontu J Agandu and Mangai M Morgan, “Energy Security in Nigeria: Challenges and Way Forward” (2013) 2:11 International Journal of Engineering Science Invention 1.

Nigeria.⁷³ Furthermore, there remain ongoing and unaddressed inefficiencies in the current methods for exploiting and utilizing the existing energy sources in Nigeria which, from all practical and economic considerations have been “uncoordinated.”⁷⁴

Accordingly, in Nigeria, the fast-growing and continued domestic reliance and demand for petroleum products has been calling for the robust pursuit of the development “of alternative fuels from locally available energy resources.”⁷⁵ But ongoing over-reliance on oil has impeded the exploration and development of alternative fuels, diversification now understood as necessary to achieve the broader energy supply mix that can ensure greater national energy security.⁷⁶ It is important to note however, that the National Energy Policy NEP, 2013 (introduced in Chapter Two), also recognized that the mere existence of adequate and diversified energy supply options in Nigeria does not necessarily guarantee the *reliability* of supply required to avoid impacts like devastating effects on the national economy.⁷⁷ Thus, under NEP, 2013, the definition of energy security in Nigeria contemplates *diversification* along with *infrastructure* development for the promotion of strategies that ensure “adequate production levels and a reliable distribution network for all fuel types to ensure steady economic growth”.⁷⁸

In 2013, I Borok, A Agandu, and M Morgan, observing unstable fuel supply and price fluctuations and the erratic supply of electricity to only about 40% of the Nigerian population,⁷⁹ posited that Nigeria could only achieve energy security if its sufficient energy reserves and resources were made *available, accessible and affordable*.⁸⁰ They also however considered *long-term* aspects of *supply* to define energy security as the availability of various energy resources that are *sustainable in terms of quantities* which furthers “economic growth, assists in poverty

⁷³ Chika Amanze-Nwachuku, “Can Nigeria End Fuel Importation in 24 Months?” *This Day Live* (19 June 2012) online: This Day Live: <http://www.thisdaylive.com/articles/can-nigeria-end-fuel-importation-in-24-months-/118241/> (accessed 6 March 2015).

⁷⁴ RC Okeke, EMC Izueke and FI Nzekwe, *supra* note 26 at 70.

⁷⁵ Energy Commission of Nigeria, *National Energy Policy (Draft Revised Edition)* (Abuja: Federal Republic of Nigeria, 2013) at 4.

⁷⁶ *Ibid.*

⁷⁷ *Ibid* at 5.

⁷⁸ *Ibid.*

⁷⁹ Maren I Borok, Agontu J Agandu and Mangai M Morgan, *supra* note 72 at 2.

⁸⁰ *Ibid* at 1.

alleviation measures, does not harm the environment and that takes note of shocks and disruptions.”⁸¹

And as similarly described in 2009 by O Ajayi and K Ajanaku, energy security in Nigeria requires the creation of an adequate energy mix, from the diverse energy sources based on a compact and concise energy development process, which is “suitable, sustainable, constantly available, environmentally friendly and economically viable in the long term national energy plan.”⁸²

So here we see Nigerian perspectives on energy security that combine the Winzer Model (risks and impacts) in combination with the Welfare Model proposed by Bohl et al. What this reveals is an appreciation of the Nigerian energy security challenge as being, in the main, an *energy insecurity* challenge, pointing to the need to move beyond *short-term responses* into *long-term strategies*.

3.2.B.ii. Energy Security Definitions in Nigerian Law and Policy

Although energy security is not entirely a recent concept at the leadership level of the Nigerian state, it has not been vigorously pursued with a sense of determination, purpose and consistency.⁸³

In Nigerian law, energy security has not been expressly defined, although aspects of the concept can be teased out from a number of different policy initiatives by the Nigerian Government.

The Federal Ministry of Science and Technology made available a Draft Energy Policy Guideline in 1984 but with contents limited in scope and depth.⁸⁴ Prior to 2003, Nigeria had no comprehensive energy policy. However, it had separate policy documents for the solid minerals,

⁸¹ *Ibid* at 2.

⁸² O Ajayi and K Ajanaku, “Nigeria’s Energy Challenge and Power Development: The Way Forward” (2009) 20:3 Energy and Environment 411-413.

⁸³ *Ibid* at 2; RC Okeke, EMC Izueke and FI Nzekwe, *supra* note 26 at 70.

⁸⁴ Federal Ministry of Science and Technology, *Draft Energy Policy Guideline* (Lagos: Federal Republic of Nigeria, 1984); See discussion in RC Okeke, EMC Izueke and FI Nzekwe, *supra* note 26 at 70.

oil, gas and electricity sub-sectors.⁸⁵ Also, the 2003 Energy Policy document (NEP, 2003), for the first time, incorporated components of renewable energy planning and development.⁸⁶

For example, the 2003 Energy Policy document stated:⁸⁷

...Enabling the establishment of facilities for the manufacture of renewable energy equipment and devices such as solar cells, PV panels and systems, wind energy equipment and biogas generators, etc...Continuation of data gathering, storage and dissemination activities while encouraging Research and Development activities in the less developed renewables with a view to possible exploitation⁸⁸... Prioritizing the level of need, technological development and viability of emerging renewable energy resources.⁸⁹

Thus NEP, 2003 had as its cardinal goal, the realization of a good mix in the development of Nigeria's energy resources in an environmentally acceptable manner capable of guaranteeing national self-sufficiency and energy security.⁹⁰ The energy policy also aimed at ensuring continuity, self-sufficiency and security of energy supply in the short, medium and long-term, at economically favourable costs.⁹¹ Further, NEP, 2003 was developed to serve as a blueprint for sustainable development, supply and utilization of energy resources within the economy, and for the use of such energy resources in global trade and diplomacy.⁹²

This ambitious reform, not having been realized, prompted new observations, contributions and recommendations by various stakeholders to be incorporated into the 2003 National Energy Policy⁹³ and resulted in the 2013 National Energy Policy (Draft Revised Edition) (NEP, 2013).⁹⁴

⁸⁵ The Petroleum Act No. 51, 1969 as amended LFN 2000 XIX LFN Ch. 350 (1990); Petroleum (Drilling and Production) Regulations [L.F.N. 69 of 1969 as amended]; Oil in Navigable Waters Act, No. 34, 1968 as amended and its subsidiary legislation LFN 2000, XIX LFN Ch. 337 (1990); Petroleum Refining Regulations 1974 LFN 2000, XIX LFN Ch. 350 (1990), LFN Ch. P10 (2004) online: <http://www.nigerialaw.org/Petroleum%20Act.htm> (accessed 22 February 2016). See also discussion in SO Oyedepo, "Towards Achieving Energy for Sustainable Development in Nigeria" (2014) 34 *Renewable and Sustainable Energy Reviews* 266.

⁸⁶ Energy Commission of Nigeria, *National Energy Policy* (Abuja: Federal Republic of Nigeria, 2003); *Ibid.*

⁸⁷ *Ibid.*

⁸⁸ *Ibid* at 77.

⁸⁹ *Ibid* at 78.

⁹⁰ Maren I Borok, Agontu J Agandu and Mangai M Morgan, *supra* note 72 at 2.

⁹¹ *Ibid.*

⁹² See NEP, 2003 at Chapters One, Two, Three, Four, Five, and Six. See also discussion in SO Oyedepo, *supra* note 85.

⁹³ *Ibid.*

A number of objectives in NEP, 2013 relate to energy security. For example:

- i. To ensure the development of the nation's energy resources, with diversified energy resource options, for the achievement of national energy security and an energy delivery system with an optimal energy resource mix.
- ii. To guarantee adequate, sustainable and reliable supply of energy at appropriate costs and in an environmentally friendly, to the various sectors of the economy, for national development.
- iii. To accelerate the process of acquisition and diffusion of technology and managerial expertise in the energy sector and indigenous participation in energy sector industries, for stability and self-reliance.
- iv. To promote research and development in, and adoption of, sustainable low carbon and clean energy technologies to mitigate environmental pollution and climate change.⁹⁵

The key objectives of NEP, 2013 that relate to energy security also aim to ensure the development of the nation's energy resources, with diversified energy resource options, for the achievement of national energy security and an energy delivery/supply system with an optimal energy resource mix.⁹⁶ Under NEP, 2013 as previously discussed, environmental and climate change considerations are a part of the energy policy objectives, however no actual initiatives have been implemented to date.⁹⁷

It should however be pointed out that law is not always necessary to achieve results. For example, independent of policy objectives in NEP, 2003 and NEP, 2013 (Draft Revised Edition), several national energy projects addressing the practical experience of energy security inefficiency were also launched in Nigeria including: the Renewable Energy Master Plan

⁹⁴ Energy Commission of Nigeria, *National Energy Policy (Draft Revised Edition)* (Abuja: Federal Republic of Nigeria, 2013) (2013 National Energy Policy) (NEP, 2013).

⁹⁵ *Ibid* at 8 & 9.

⁹⁶ These provisions include: ensuring the development of the nation's energy resources, with diversified energy resource options, for the achievement of national energy security and an energy delivery system with an optimal energy resource mix; establishment of demonstration and pilot projects as well as holding workshops and public education campaigns on solar energy, biomass, biogas, wind and other renewable energy resources to ensure their adoption and market penetration; etc. See Energy Commission of Nigeria, *National Energy Policy (Draft Revised Edition)* (Abuja: Federal Republic of Nigeria, 2013) at 8, 9 and 70.

⁹⁷ See also discussion in SO Oyedepo, *supra* note 85.

(REMP);⁹⁸ the National Energy Master Plan (NEMP);⁹⁹ the Renewable Electricity Action Programme;¹⁰⁰ the National Renewable Energy and Energy Efficiency Policy (NREEEP);¹⁰¹ and the Canadian Government's Clean Development Mechanism Small Projects Facility for Nigeria.¹⁰²

Therefore, regardless of the lack of legal "suasion" for implementing energy security policy in Nigeria, the desired results of the energy security policy objectives can also be potentially achieved through, for example, the acceleration of the process of acquisition and diffusion of technologies and managerial expertise in the energy sector and indigenous participation in energy sector industries aimed at stability and self-reliance.¹⁰³

What this ultimately demonstrates is that the existence of an energy (security) policy, while vital, does not guarantee the prudent development and utilization of national energy resources.¹⁰⁴ The absence of the political will to tackle corruption in the Nigerian energy industry, for example, has impeded the proper implementation of the energy security policy objectives, and has played

⁹⁸ Federal Ministry of Environment, *Nigerian Renewable Energy Master Plan* (Abuja: Federal Republic of Nigeria, 2011). The Renewable Energy Master Plan (REMP) seeks to increase the supply of renewable electricity from 13% of total electricity generation in 2015 to 23% in 2025 and 36% by 2030. Renewable electricity would then account for 10% of Nigerian total energy consumption by 2025.

⁹⁹ Federal Ministry of Power, *The National Energy Master Plan* (Abuja: Federal Republic of Nigeria, 2007). The National Energy Master Plan (NEMP) of 2007 sets the implementation framework of the National Energy Policy (NEP). It covers all energy sources, energy utilization, manpower development, energy financing, energy databank and the project cycle (planning, implementation and monitoring and evaluation).

¹⁰⁰ Federal Ministry of Power, *Renewable Electricity Action Programme* (Abuja: Federal Republic of Nigeria, 2006). The former Ministry of Power and Steel together with the International Centre for Energy, Environment and Development (ICEED) created the Renewable Electricity Policy Guidelines in 2006, focusing on the use of small scale renewables for rural electrification, regarded as a predecessor of the Renewable Energy Master Plan (REMP). Also in 2006, the same two actors launched the Renewable Electricity Action Programme (REAP) operationalizing the guidelines.

¹⁰¹ Federal Ministry of Power, *National Renewable Energy and Energy Efficiency Policy* (Abuja: Federal Republic of Nigeria, 2015). The National Renewable Energy and Energy Efficiency Policy (NREEEP) of 2015 provides an overarching framework for renewable energy and energy efficiency, thereby functioning as an umbrella policy for the various existing documents and serving as a reference document (anchor) for concrete implementation measures.

¹⁰² See the International Centre for Energy, Environment and Development, "Energy and Climate Security for Nigeria's Poor" online: ICEED – People Detail <<http://www.iceednigeria.org/person/prof-richard-olayiwola-fagbenle/#>> (accessed 3 May 2015).

¹⁰³ Energy Commission of Nigeria, *supra* note 94.

¹⁰⁴ SO Oyedepo, *supra* note 85.

a major role in the country's chronic energy insecurity.¹⁰⁵ More is therefore needed to achieve the long-sought after energy security in Nigeria.

3.2.C A Preliminary Revised Definition of Energy Security for Nigeria

There is an urgent need for a revised energy security definition that will recognize the principal issues and key problems in the Nigerian energy industry and mobilize it to tackle the challenges of energy security. Based on the foregoing discussion including observations from the previous chapters, it is my view that a definition for Nigeria should first emerge from a domestic *energy insecurity* lens and include integration of risk/impacts, supply and demand balancing, economic welfare objectives, along with short-term and long-term views on availability, accessibility and affordability.

Accordingly, the following preliminary definition of energy security is proposed:

the capacity of the Nigerian economy to ensure sufficient energy resource supply availability and accessibility in an economically sustainable and timely way at reasonable cost through a reliable energy distribution networks, free from grave threats of supply service disruption, with a main focus on furthering economic growth (without compromising environmental standards) suitable for the present (economic climate) and the predictable/foreseeable future.

3.3. Leveraging Climate Change Risk Regulation

3.3.A. Is Preliminary Revised Definition Sufficient?

As discussed in the previous chapters, globally, the issues that have risen to the top of the policymakers' agenda include the extent to which impacts of the changing climate system being experienced all across the globe in various dimensions affect the energy industry and the coping

¹⁰⁵ C Ochayi, "FG Canvasses Foreign Investments in Power Sector...Says Sector requires \$10 Billion In 5 Years" *The Vanguard* (3 February 2014) online: Vanguard News: <<http://www.vanguard.com/2014/02/fg-canvasses-foreign-investments-power-sector-says-sector-requires-10-billion-5-years/#sthash.FkNJtAvP.dpuf>> (Accessed 8 March 2015); Akin Iwayemi, "Nigeria's Dual Energy Problems: Policy Issues and Challenges" (2008) International Association for Energy Economics.

strategies available in addressing the climate change menace which poses critical risks and threats to energy security.¹⁰⁶

However, as also earlier described, conceptions of energy security differ between energy importers and energy exporters. For exporters like Nigeria, Russia and Saudi Arabia, renewable energy, to the extent that it competes with fossil fuels, can be a threat to their income and therefore a threat to their energy and economic security.¹⁰⁷ The revised definition of energy security suggested above considerably recognizes the necessary relationship between energy security and economic growth, but much less on the connections between energy security and climate change. The definition is also silent on the increasingly important contributions that the development and utilization of renewable energy resources can make to the promotion of energy security and climate change objectives in Nigeria. Although the definition makes reference to “environmental standards”, the reference is vague and fails to specifically identify the need for and benefit of capturing climate policy in energy security objectives. Therefore, this largely economic conception of energy security is likely to predominate over environmental objectives including mitigation of climate change. Also, the definition, in any event is not sufficient to respond to the projected impacts of climate change – a major threat to Nigeria for reasons already explored in Chapter One.

To summarize, energy security and climate change policy are presently not properly integrated in Nigeria despite the obvious linkages. And, it is pertinent to note that establishing the connection between energy security and climate change policy could promote energy security and climate change objectives at the local, national, and global levels. Indeed, the energy security objectives listed above in formulating the preliminary revised energy security definition point to the need for infrastructure to support energy supply diversification. This in turn (in my view) can be provoked by leveraging obligations emerging from global climate change risk regulation as discussed in the previous chapter.¹⁰⁸

¹⁰⁶ Opeyemi Akinyemi, Adeyemi Ogundipe and Philip Alege, “Energy Supply and Climate Change in Nigeria” (2014) 4:14 *Journal of Environment and Earth Science* 47-61.

¹⁰⁷ David Toke and Sevasti-Eleni Vezirgiannidou, “The Relationship between Climate Change and Energy Security: Key Issues and Conclusions” (2013) 22:4 *Environmental Politics*.

¹⁰⁸ The primary focus of the global community is on mitigation measures to reduce emissions and increase the sinks of greenhouse gases to prevent catastrophic climate change impacts, see Theme One, Part X of Chapter One.

The urgent need to advance energy security and climate change objectives simultaneously is increasingly acknowledged by policymakers. Policymakers also pay considerable attention to energy security, energy efficiency, and environmental protection concerns. In the course of creating a balance between energy security objectives and climate change objectives, various policies must be made to stimulate the transition to climate-friendly green energy technologies. Such policies are likely to entail emerging strategic and political risks that must be properly evaluated in the course of addressing energy security, climate security, and human security concerns. In Nigeria, energy security and climate change policies can be mutually beneficial and rewarding because energy conservation and energy efficiency schemes are capable of improving and furthering energy security and climate change mitigation goals.

Further, at the Paris Climate Summit, Nigeria promised “to reduce emissions by 20% unconditionally and 45% conditionally, compared to business levels, by 2030.”¹⁰⁹

3.3.B. Preliminary Integrated Definition of Energy Security

Based on the foregoing, “energy security” definition from above should be revised as follows:

the production of an adequate energy mix, from the sufficient energy reserves and resources made constantly available, accessible and affordable channeled through a reliable energy distribution systems in a climate-friendly and economically viable manner with renewables’ exploration and utilization at its core based on the recognition of the need to further economic growth without compromising energy policy/sector/security or climate change objectives.

In addition to incorporating, the ‘economic aspects of energy security’ (availability, accessibility, affordability), this integrated definition centralizes the exploration and utilization of renewables to further economic growth and development in a manner that promotes climate change. The definition explicitly balances the climate change mitigation interests with the energy security and economic interests. Therefore, this integrated definition gives rise to the notion of ‘climate change/environmental aspects of energy security’ because it focuses on the climate change perspective of energy security and energy use.

The UNFCCC member states have also made efforts to reach several agreements and devise measures (e.g. Clean Development Mechanism; Emissions Trading; and Joint Implementation) towards climate change mitigation and adaptation, see Theme Two, Part X of Chapter One.

¹⁰⁹ Carbon Brief CLEAR ON CLIMATE CHANGE, “Paris 2015: Tracking country climate pledges” (2015) Carbon Brief Online: <<http://www.carbonbrief.org/paris-2015-tracking-country-climate-pledges>> (accessed 22 February 2016).

This integrated definition thus explores *energy security* as the principal means through which both energy sector objectives and climate change objectives can be promoted in Nigeria hinged on climate resilient energy systems.

3.4. Observations

This chapter examines the various definitions of energy security from the global and national perspectives, including the definitions of energy security peculiar to USA, UK, China, etc. It has shown that conceptions of energy security differ between energy importers and energy exporters. Also, energy importers and energy exporters deploy different strategies to pursue their energy security goals and objectives. As a matter of fact, the concept of energy security is capable of acquiring different meanings under various circumstances. The divide between developed and developing countries is also evident from a variety of ways in which their governments and policymakers interpret and conceptualize energy security. It seems to me that governments, corporations, groups and individuals interpret the concept of energy security in a manner that suits their best interests.

In Nigeria, the sole dependence on a particular energy option defeats its energy security objectives while the current method of exploiting and utilizing the country's energy resources from all practical, environmental and economic considerations is quite uncoordinated. Also, the lack of the political will on the part of the government officials and policymakers impedes the achievement of energy security in Nigeria. Further, the existence of a National Energy Policy has not guaranteed the prudent development and utilization of the nation's energy resources thus leading to grave energy insecurity in the country. Through the lens of *energy insecurity*, this chapter first develops a definition of energy security which is then deemed insufficient because it only prioritizes an economic conception of energy security and thus fails to capture and in turn respond to projected impacts and objectives of climate change. Accordingly, the chapter offers a preliminary integrated definition of energy security that properly captures the objectives of climate change. This preliminary integrated definition moves away from the general notion of *energy insecurity* towards a *resilience* model, as energy security and climate change objectives can be achieved through the exploration and utilization of renewable energy resources.

Having now discussed and examined the concept of energy security and the global definitions of energy security as well as definitions more specific to the Nigerian experience and law and policy framework, we now move to Chapter Four which explores in more detail the concept of energy security in Germany. Specifically, Chapter Four examines Germany's Integrated Energy and Climate Programme and the bold initiatives taken and implemented by Germany with the purpose of tackling energy security and climate change concerns simultaneously. The overarching purpose of Chapter Four is to study the ambitious integration strategies executed by Germany with the principal aim of gaining further insights for evolving the integrated definitional and policy framework of energy security in Nigeria.

CHAPTER FOUR: AN INTEGRATED APPROACH TO ENERGY SECURITY AND CLIMATE CHANGE: LESSONS FROM GERMANY

4.1 Introduction

Some would state that the advent of climate change policy as an essential element of energy security policy is fast becoming irreversible and permanent.¹ For example, climate change plays an increasingly significant role in Germany's energy security policy debates, to the extent that Germany has begun to formulate and implement climate change mitigation strategies that address the strategic interactions between energy security and climate change. In order to shape the immediate and remote policy responses to climate change and tackle various climate-related threats to energy security, Germany continues to develop and implement an inclusive strategy that responds to and prepares for climate change-induced energy insecurity.

Throughout the course of German European Union (EU) and G8 Presidencies, energy security and climate change were prominent issues on the agenda of the 2007 Brussels European Council's summit.² In March 2007, under the German Presidency, the heads of state and government of the EU made a historical resolution which paved the way for an integrated European Climate and Energy Policy.³ The resolution stated that:

The challenges of climate change need to be tackled effectively and urgently. Recent studies on this subject have contributed to a growing awareness and knowledge of the long-term consequences, including the consequences for global economic development, and have stressed the need for decisive and immediate action. The European Council underlines the vital importance of achieving the strategic objective of limiting the global average temperature increase to not more than 2°C above pre-industrial levels.

¹ John Deutch, Anne Lauvergeon & Widhyawan Prawiraatmadja, *Energy Security and Climate Change* (Washington, Paris, Tokyo: The Trilateral Commission, 2007).

² "2007 Brussels European Council's summit – Council of the European Union, Brussels," 2 May 2007 (2007 Brussels European Council's summit – Presidency Conclusions) online: <http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/ec/93135.pdf> (accessed 29 June 2016); For further discussion see, Petra Dolata-Kreutzkamp, "Canada-Germany-EU: Energy Security and Climate Change" (2008) 63:3 International Journal 665.

³ P Dolata-Kreutzkamp, *ibid*.

Given that energy production and use are the main sources for greenhouse gas emissions, an integrated approach to climate and energy policy is needed to realise this objective. Integration should be achieved in a mutually supportive way. With this in mind, the Energy Policy for Europe (EPE) will pursue the following three objectives, fully respecting Member States' choice of energy mix and sovereignty over primary energy sources and underpinned by a spirit of solidarity amongst Member States: – increasing security of supply; – ensuring the competitiveness of European economies and the availability of affordable energy; – promoting environmental sustainability and combating climate change.⁴ [emphasis added]

Also, in early June 2007 in Berlin (Germany) at the Canada-EU high-level summit, there was a thematic manifestation of energy security and climate change concerns. As put by the 2007 EU-Canada Summit Statement:

Both a sustainable environment and a sustainable economy are keys to the well-being of our peoples and our planet. We are convinced that tackling climate change and ensuring clean, secure and affordable supplies of energy are central, interlinked global challenges. Addressing these issues requires urgent, sustained global action and an integrated policy approach, using a wide range of regionally, nationally or internationally defined policy tools and measures. We are determined to ensure access to affordable, clean and secure sources of energy to underpin sustainable global economic growth and to protect our environment. Tackling the challenge of energy security will also require unprecedented international cooperation in several areas, including increasing energy efficiency, market transparency, diversifying energy supplies - including the share of renewable energies - and protecting and maintaining the world's energy supply system. [emphasis added]⁵

In addition to re-asserting the broad themes of international climate change initiatives of mitigation, cooperation and integration/uniformity (as discussed in Chapter 1, Part 1.3.J), the

⁴ "2007 Brussels European Council's summit – Council of the European Union, Brussels," *supra* note 2.

⁵ .e. the Berlin summit agenda "2007 Canada-EU Summit Statement, Berlin," 4 June 2007 (2007 Canada-EU Summit Statement) <http://www.canadainternational.gc.ca/eu-ue/bilateral_relations_bilaterales/2007_06_04_statement-declaration.aspx?lang=eng> (accessed 26 March 2016).

final joint statement particularly and unequivocally proclaimed energy and climate security to be one of the three primary spheres for future collaboration.⁶

The purpose of this chapter is to obtain additional insight for evolving the definitional and policy framework of energy security in Nigeria through an examination of bold initiatives taken by Germany. Germany was selected precisely because Germany has successfully developed an integrated energy scheme, enabling it to achieve significant GHG emissions reductions while increasing energy security diversification. Therefore, Germany offers one model of an efficient and diversified energy industry that Nigeria can consider and potentially model in its law and policy reforms with respect to re-defining energy security from a climate change response perspective.

That said, it cannot be assumed that modeling German law and policy would be a straightforward task for Nigeria. Accordingly, the discussion below begins in Part 4.2. with a brief consideration of the theory of “legal transplantation”, in order to at least raise for the reader the question of the overall feasibility of “moving” the German model of the rule and system of law and policy (related to energy security and climate change integration) from Germany to Nigeria. Part 4.3 continues with the discussion of why Germany’s recent and bold energy security model has been selected for study herein for the purpose of gleaning insights for Nigerian implementation. Part 4.4 describes Germany’s energy security and climate change initiatives and Part 4.5 describes Germany’s overall energy security policy objectives and provides a definition of energy security based on Germany’s integrated approach to energy and climate change. Using insights gleaned from Germany’s approach, the chapter ends in Part 4.6 with a revision to the integrated definition of energy security for the Nigerian context first introduced in Chapter 3. The Chapter concludes with some final observations in Part 4.7 which include a consideration of the extent to which the Nigerian energy industry and energy policy could actually follow Germany’s lead with the aim of identifying and refining factors for possible incorporation into the Nigerian context.

4.2. Theory of Legal Transplantation

⁶ 2007 Canada-EU Summit, *ibid.*

“Legal transplantation” rests on the proposition that law is not totally a reflection of the community in which it operates, but largely taken from other systems and societies.⁷

Alan Watson acknowledges the inevitability of legal transplants.⁸ According to Watson,

“Legal transplantation” is “the moving of a rule or a system of law from one country to another or from one people to another.”⁹

In the western world, legal transplants have been the principal and significant consideration in legal change and revision since “the later Roman empire.”¹⁰ Watson describes the “real issue” behind legal transplantation is, “whether there should be a deliberate concerted effort, spear-headed perhaps by academics, to create a common law.”¹¹

‘Diversity’ in law has both benefits and pitfalls. However, it is pertinent to “point out how much of a nation’s law – rules, institutions, concepts, structures – results from borrowing.”¹² Rosaline Baindu Cowan has submitted that the principal reason for resorting to legal transplantation is the assumption that because it succeeded in one country or legal system, there should be no difficulties making it suitable for a new use or purpose in another country or legal system.¹³ Pier Giuseppe Monateri has also concluded that legal transplantation is inevitably connected to the transfer of legal culture since it unavoidably creates the transfer of normative aspect of the law.¹⁴ But since law functions as an element of the framework through which a whole society can better understand and appreciate itself, comparative legal studies can advance “our understanding of other peoples by shedding light on how they understand their law.”¹⁵ In the light of this assertion, it is argued that countries are inclined to embrace the legal system relevant in another country with comparable conditions and circumstances.

⁷ Alan Watson, “The Birth of Legal Transplants” (2012-2013) 41 Ga J Int'l & Comp L 605 at 607.

⁸ A Watson, “Legal Transplants and European Private Law” (200) 4:4 Electronic Journal of Comparative Law 10, available at <<http://www.ejcl.org/ejcl/44/44-2.html>> (accessed October 8, 2015).

⁹ Alan Watson, *Legal Transplants: An Approach to Comparative Law* (Edinburgh: Scottish Academic Press 1974) at 21.

¹⁰ *Ibid.*

¹¹ *Ibid.*

¹² A Watson, *supra* note 8 at 11.

¹³ Rosaline Baindu Cowan, “The Effect of Transplanting Legislation from one Jurisdiction to Another” (2013) 39:3 Commonwealth Law Bulletin 479 at 485.

¹⁴ Pier Giuseppe Monateri, ed, *Methods of comparative Law* (Uk: Edward Elgar Publishing 2012) at 192.

¹⁵ Pierre Legrand, “The Impossibility of Legal Transplants” (1997) 4 Maastricht J Eur. & Comp. L 111 at 124.

On the other hand, Otto Kahn-Freund warns that comparative analysis of law “becomes an *abuse* ... if it is informed by a legalistic spirit which ignores [the] context of the law.”¹⁶ Furthermore, Pierre Legrand dismisses Watson’s perspective on the *inevitability* of legal transplant as simplistic and contends that legal transplantation as proposed by Watson is unfeasible and impracticable because it is impossible for rules of law to be moved across jurisdictions due to the character of law. That is, its movement is mostly encumbered “by historical, epistemological, or cultural baggage.”¹⁷ Legrand further argues that Watson’s submission in favour of legal transplantation is “profoundly lacking in explicatory power.”¹⁸ As Legrand points out, considering that the definition and meaning invested into a legal rule is itself culture-specific makes it difficult to conceive how the rule and its meaning would be able to journey from one legal system to another.¹⁹

Indeed, Legrand generally objects to Watson’s views which he considers as offering an extremely impoverished account “of interactions across legal systems – the result of a particularly crude apprehension of what law is and of what a rule is.”²⁰ Accordingly, it is Legrand’s opinion that the original rule certainly receives an alteration and modification that influences it *qua* rule, as it crosses boundaries. Thus, he concludes that “legal transplants are impossible” when laws are considered as a culturally-situated phenomenon.²¹ It is Legrand’s belief that only a meaningless form of words can be displaced from one jurisdiction to another at best. “[Legal transplants], therefore cannot happen.”²²

Otto Khan-Freund also argues that legal transplantation is impossible because an institution can only be conceived of and developed to be suitable for one country - it is extremely hard to use it to suit another.²³ Nevertheless, Watson argued against Otto Khan-Freund’s argument by positing that history has proven legal transplantation possible. In support, Watson provides an example concerning the early history of the French *Code Civil* in Belgium. The 1797 annexation of

¹⁶ Otto Kahn-Freund, “On Uses and Misuses of Comparative Law” (1974) 37 Modern Law Review 1 at 27.

¹⁷ Pierre Legrand, *supra* note 15 at 114.

¹⁸ *Ibid.*

¹⁹ *Ibid* at 117.

²⁰ *Ibid* at 113.

²¹ *Ibid* at 124.

²² *Ibid* at 120.

²³ Rosaline Baindu Cowan, *supra* note 13 at 480.

Belgium to France made the French *Civil Code* automatically come into force on its promulgation in 1804.²⁴ Also, the *Civil Code* continued to be the law of Belgium when French domination ended regardless of the fact that Belgium was a land of numerous local customs before the imposition of French *Civil Code*.²⁵ In modern history, Turkey has been typically seen as the most extreme example of legal transplant because it successfully chose, translated, adapted and adjusted the civil law, the law of obligations and civil procedure from Switzerland, commercial law, maritime law and criminal procedure from Germany, criminal law from Italy and administrative law from France to solve the social and legal problems of the country (Turkey) and to fit together²⁶ but recently, we have also witnessed the emergence of the Civil Codes (or drafts) of the states of the defunct Soviet Union. For example, more than “ninety seven percent of the draft of Book 2 of the Armenian *Civil Code*, “Obligations”, is taken straight from the Russian *Civil Code*.²⁷ The draft is written in Russian, not in Armenian.”²⁸ Watson also identifies the various yet similar *International Sale of Goods* laws as another example of a different form of legal transplant.²⁹

Apart from overarching observations that legal transplantation has or may have occurred, there is still the issue of “how” it actually occurs. The complex and difficult situations that may arise if the drafter cannot integrate the laws being transplanted with that of the recipient country has exposed legal transplantation to the criticism that it is a disorganized, unsystematic and unmethodical manner of legislating.³⁰ This impression of legal transplantation demonstrates that

²⁴ A Watson, *supra* note 8 at 10.

²⁵ *Ibid.*

²⁶ The main draftsman of the Turkish civil code, Mahmut Esad Bozkurt, had studied Law in Switzerland and that was the law he knew. The popular opinion among scholars is that this fact is the principal reason for the choice of Swiss law for the foundation of the Turkish civil code. In fact, what was borrowed was not just the Swiss codes, but their court decisions and academic opinion. What can be, and is, borrowed is not just statutory rules. Also, there was a continuing relationship between Turkish law and European codes. See A Watson, *supra* note 8 at 6 & 7. For more detail, see Alan Watson, *The Evolution of Western Private Law* (Baltimore: Johns Hopkins University Press, 2001).

²⁷ *Ibid.*

²⁸ *Ibid.*

²⁹ *Ibid.*: For a very long time, it was felt that transnational mercantile transactions would be greatly helped if there was a uniform contract law that crossed national borders. Accordingly, the United Nations Convention on the Contracts for the International Sale of Goods came into force in 1988. The Convention when it came into force did not represent the law of any state. However, it has been enacted as law in 54 countries: this is a good example of a successful legal transplant. Countries that have enacted the Convention include the following; Canada, United States of America, Switzerland, China, Republic of Benin, Italy, Japan, Israel, Russian Federation, Iraq, Turkey, etc.

³⁰ Rosaline Baidu Cowan, *supra* note 13 at 479.

local social circumstances play a very significant role in legal transplantation and may even determine whether the transplantation scheme would have a favourable outcome or not.³¹ Moreover, the geographical location, political and economic conditions of a recipient country are extremely critical to the success and effectiveness of a legal transplantation scheme.³²

This brief review of proponents and opponents of the theory of legal transplantation reveals at least, that the movement of law from one country to another is possible. However, opponents of legal transplantation maintain that the specific nature of law, cultural differences, geopolitical location, political and economic situations prevailing in a recipient state do not guarantee the success of such a transplantation scheme.

Thus, it is appropriate to state that when a country is contemplating the adoption of a legal rule from another country, the recipient country should not just duplicate it but should have recourse to its conformability and flexibility within the socio-cultural background,³³ geographical location, political and economic situations of the recipient state so as to make the transplantation scheme effective and productive. This approach to addressing the pitfalls or shortcomings illuminated pursuant to the theory of legal transplantation would therefore support gleaned insights from the proposed “donor” jurisdiction(s) with the aim of infusing originality into such insights in order to develop feasible and flexible schemes capable of responding to the particular needs of the recipient state.

Placing the foregoing discussion into the Germany as donor state and Nigeria as recipient state, the following observations can be made.

Germany and Nigeria have similarity in several fundamental features including: both are respectively, the most powerful and competitive economies in Europe and Africa;³⁴ both are

³¹ *Ibid* at 484.

³² *Ibid* at 485.

³³ Janet Oluwadunni Shodipo, “Gas to Power: Enhancing and Optimizing the Domestic Gas Supply Obligation for Improved Power Generation and Supply in Nigeria” (Master of Laws, University of Manitoba, 2015) [Unpublished].

³⁴ British Broadcasting Corporation, “Germany country profile” BBC News (12 February 2016) Online: <<http://www.bbc.com/news/world-europe-17299607>> (accessed 24 February 2016); Vera Songwe, “The EU-Africa Summit: Why Germany Should Take Center Stage” Brookings Institution (3 April 2014) Online: <<http://www.brookings.edu/blogs/africa-in-focus/posts/2014/04/03-germany-european-union-africa-summit-songwe>> (accessed 24 February 2016); The Economist, “Nigeria, Africa’s new Number One - Nigeria’s suddenly supersized economy is indeed a wonder; but so are its still-huge problems” The Economist (12 April 2014) Online:

experiencing a huge rise in energy demand (huge energy consumers);³⁵ both place their existing domestic energy market obligations within a legal framework;³⁶ both have vast coal reserves;³⁷ both are challenged as major emitters of greenhouse gases;³⁸ and both have enormous renewable energy resources.³⁹

Unlike Nigeria however, Germany is a country that has surely been the most proactive in the pursuit of energy efficiency and the development of renewable energies.⁴⁰ The German public is also highly sensitive to environmental impact and willing to invest in developing renewable energy technologies.⁴¹ The daring choices made by Germany through its *Energiewende*⁴² (German for *Energy transition*) designed to transform the country into an energy portfolio

<<http://www.economist.com/news/leaders/21600685-nigerias-suddenly-supersized-economy-indeed-wonder-so-are-its-still-huge>> (accessed 24 February 2016).

³⁵ Ulf Hansen, "Delinking of energy consumption and economic growth: The German experience" (2003) 18:7 Energy Policy 631 – 640; Adegbemi Babatunde Onakoya et al., "Energy Consumption and Nigerian Economic Growth: An Empirical Analysis" (2013) 9:4 European Scientific Journal 25 – 40 Online <<http://eujournal.org/index.php/esj/article/view/765/799>> (accessed 24 February 2016).

³⁶ International Energy Agency, *Oil and Gas Security: Emergency Response of IEA Countries – Germany* (Paris: International Energy Agency Publications, 2012) Online: <<http://www.iea.org/publications/freepublications/publication/germanyoss.pdf>> (accessed 24 February 2016); Onyekachi Duru, "An Appraisal of the Legal Framework for the Regulation of Nigerian Oil and Gas Industry, with Appropriate Recommendations" (2011) Social Science Electronic Publishing Online: <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2137979> (accessed 24 February 2016).

³⁷ International Energy Agency, *ibid* note 36; VC Sharma and A Sharma, "Nigeria's Primary Energy Reserves: Domestic Consumption and Future Outlook" (1991) 16:5 Energy 817-822.

³⁸ Simon Rogers, "World carbon emissions: the league table of every country" The Guardian (21 June 2012) Online: <<http://www.theguardian.com/environment/datablog/2012/jun/21/world-carbon-emissions-league-table-country>> (accessed 24 February 2016).

³⁹ International Energy Agency, *supra* note 36; SO Oyedepo, "Energy in Perspective of Sustainable Development in Nigeria" (2013) 1:2 Sustainable Energy 14-25 Online: <<http://pubs.sciepub.com/rse/1/2/2/>> (accessed 24 February 2016).

⁴⁰ Franz-Josef Brüggemeier, *Sun, Water, Wind: Development of the Energy Transition in Germany* (Bonn: Friedrich Ebert Foundation, 2015/2017) Online: <<http://library.fes.de/pdf-files/wiso/12110.pdf>> (Accessed 24 February 2016); See also Matthew Karnitschnig, "Germany's Expensive Gamble on Renewable Energy" The Wall Street Journal (26 August, 2014) online: <<http://www.wsj.com/articles/germanys-expensive-gamble-on-renewable-energy-1409106602>> (accessed 7 November, 2015).

⁴¹ *Ibid*.

⁴² Craig Morris and Martin Pehnt, *Energy Transition: The German Energiewende* (Berlin: Heinrich Böll Stiftung, 2015) Online: http://energytransition.de/wp-content/themes/boell/pdf/en/German-Energy-Transition_en.pdf (accessed 24 February 2016); Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, "Key Elements of an Integrated Energy and Climate Programme - Decision of German Cabinet on August 23rd/24th 2007 at Meseberg" Online: <http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/klimapaket_aug2007_en.pdf> (accessed 24 February 2016).

dominated by renewable energy, energy efficiency and sustainable development can also be regarded as a means of further consolidating its industrial power and global leadership.⁴³

Notwithstanding that Germany has not had a hundred percent success in implementing the energy policies set to transform its economy into an energy portfolio dominated by renewable energy (discussed below), energy efficiency and sustainable development, there are great lessons Nigeria can glean from Germany's experiences in order to integrate and promote its energy security and climate change objectives. This is feasible because both Germany and Nigeria have democratic political and legal cultures that at a basic level can trigger campaigns like environmental or energy conservation campaigns. And, similar to the Nigerian challenges, Germany's commitment to energy conservation and alternative energy sources was forged against a backdrop of security issues, steep price increases, and high CO₂ emissions where 62 percent of its energy is imported.⁴⁴

Finally, as described above, critics of the theory of legal transplantation raise the concern that in order for legal transplantation to have any chance of success, a country cannot simply duplicate a legal rule; the country must contemplate and infuse the donor legal rule with the peculiarities of the recipient state in order to be able to actually respond to the needs of the recipient state. This illuminates an interesting point for this discussion. Because the entire matter of energy security in the first instance rests on the peculiarities of the particular state at issue (e.g. natural resources available; available infrastructure; socio-political environment etc),⁴⁵ the matter of addressing energy security is arguably exceedingly well-positioned for the application of a legal transplantation approach. Therefore, policymakers and regulatory institutions have a primary role to play in providing adequate information to the Nigerian government on the continuing global shifts in the energy industry and how government policies can successfully promote the

⁴³ Leonid Bershidsky, "Germany's Green Energy is an Expensive Success" Bloomberg View (22 September, 2014) online: <<http://www.bloombergvew.com/articles/2014-09-22/germany-s-green-energy-is-an-expensive-success>> (accessed 7 November 2015).

⁴⁴ G Bruce Doern and Burkard Eberlein, *Governing the Energy Challenge: Canada and Germany in a Multi-level Regional and Global Context* (Toronto: University of Toronto Press, 2009); Caroline Kuzemko, Michael F Keating & Andreas Goldthau, *The Global Energy Challenge: Environment, Development and Security* (London: Palgrave Macmillan, 2015); George Walter Hoffman and Leslie Dienes, *The European Energy Challenge: East and West* (Durham: Duke University Press, 1985).

⁴⁵ See discussion in Chapter 3.

development and implementation of an integrated energy security and climate change policy in Nigeria.

Having established that legal transplantation could at least be a possibility for Nigeria in the matter of energy security (the ability to unequivocally establish this being beyond the scope of this particular discussion), we now turn to why Germany has been selected as a model for Nigeria to consider.

4.3. Why Germany as a Model for Nigeria?

Every member of the European Union (EU) has adopted considerably ambitious renewable energy production goals and very bold carbon emissions reduction targets of at least 20 percent by 2020.⁴⁶ However, Germany leads the way in the development of green energy technologies and has the most ambitious strategies in Europe for energy conservation and diversification targeting a 30 percent cut in energy consumption by 2020 and a 30 percent share of renewable energy (principally in the form of wind, solar, and biomass).⁴⁷ Also, new figures released by the European Wind Energy Association (EWEA) indicate almost 11.8GW (gigawatt) of wind power was added to the grid across the European Union in 2014, accounting for about 43.7 percent of all recent electricity generation achievements.⁴⁸ The report of the EWEA further reveals that Germany leads record wind power growth in Europe and was by far the largest market in 2014, installing almost half of new wind farms in the EU.⁴⁹ Germany successfully built a massive 5.2GW of new wind power capacity in 2014. The United Kingdom (UK) came in second with the installation of 1.7GW of new capacity during 2014, followed by Sweden with 1.05GW and France with 1.04GW.⁵⁰ 59.5 percent of all new wind power installations in 2014 were in two

⁴⁶ José Manuel Barroso, *COMMUNICATION FROM THE COMMISSION EUROPE 2020: A strategy for smart, sustainable and inclusive growth* (Brussels: European Commission, 2010); See also Anne Power and Monika Zulauf, "Cutting Carbon Costs: Learning from Germany's Energy Saving Program" (2011) London School of Economics, Department of Housing and Communities online: <<http://sticerd.lse.ac.uk/dps/case/cp/CCCfull.pdf>> (accessed 30 June 2016) 8.

⁴⁷ Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, *supra* note 42; Power and Monika Zulauf, *ibid.*

⁴⁸ Giorgio Corbetta et al., *Wind in Power: 2014 European Statistics* (Brussels: European Wind Energy Association, 2015) 3.

⁴⁹ *Ibid.*

⁵⁰ *Ibid* at 5.

countries (Germany and the UK) and 77.2 percent of all new installations were concentrated in Germany, the UK, Sweden and France.⁵¹

Further, as mentioned, the German government has developed an integrated energy and climate scheme that is without precedent in the history of German climate policy as well as globally. In fact, there is no other similar industrial country that has an equally bold and concrete integrated strategy as Germany.⁵² The integrated energy security and climate change scheme will enable Germany to achieve a reduction of GHG emissions by 36 percent which is a crucial step toward achieving its climate security target of 40 percent reduction in GHGs emissions by 2020.⁵³ It is expected that Germany will experience increasingly concentrated growth in its renewable energy market beyond 2015 as a result of the focused implementation of the Integrated Energy and Climate Programme devised by the German Government.⁵⁴ Therefore, Germany is arguably the leading renewable energy market in the world. It has made giant strides in wind energy, solar energy and biomass energy.

Germany is held up as an emblematic climate change regulation and energy transition jurisdiction and is useful in many respects, particularly with regard to my comparative analysis. However, it is also very important to acknowledge and engage with the profound structural, social, legal and economic (not to mention environmental) differences between Germany and Nigeria. Nigeria, Germany, Argentina, Australia, Austria, Canada, India, Russia, South Africa, Switzerland, and the United States are 11 of the 25 world's federations⁵⁵ with legislative, executive, and judicial institutions. Both Germany and Nigeria have a federal political system and each has key institutions that, at one level, are broadly similar in kind but the differences are

⁵¹ *Ibid* at 3.

⁵² Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, *Report on Implementation of the Key Elements of an Integrated Energy and Climate Programme of the German Government Adopted in the Closed Meeting of the Cabinet on 23/24 August 2007 in Meseberg* (5 December 2007) online: <http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/hintergrund_meseberg_en.pdf> (accessed 27 September 2015) 1.

(Bonn: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, 2007) 1. Germany has already achieved more than 18 percent reduction in GHGs emissions compared to 1990 levels. See Helmut Weidner, "Climate Change Policy in Germany: Capacities and Driving Forces" (Paper prepared for the Workshop "The Politics of Climate Change" ECPR Joint Session of Workshops in Rennes, 11-16 April 2008).

⁵³ *Ibid*.

⁵⁴ *Ibid*.

⁵⁵ For the complete list, see Forum of Federations, "List of Federal Countries" Forum of Federations Online: <<http://www.forumfed.org/federalism/cntrylist.asp?lang=en>> (accessed 23 June 2016).

more complex and require more meticulous consideration.⁵⁶ There are primary logical differences between Germany and Nigeria “by reference to the size and wealth of the two federations, features of their federal arrangements, and the general constitutional framework of their institutions of government.”⁵⁷ Nigeria has a total area of 923,768 km² (356,669 sq mi) making it the world's 32nd-largest country (after Tanzania) while Germany has a total land mass of 357,168 km².⁵⁸ Cheryl Saunders noted that “very large territorial areas present particular challenges for the coverage of both national institutions and the institutions of larger constituent units.”⁵⁹ Also, the differences in the population size of Germany and Nigeria are equally striking; Germany and Nigeria have substantial populations of 81 million and 174 million, respectively.⁶⁰

The economic prosperity of Germany and Nigeria is a pertinent factor, with the capacity to influence the design and operation of institutions, including energy and environmental bodies and the quality of services they provide. In this regard, there are significant differences between the economic prosperity of Germany and Nigeria.⁶¹ Specifically, Germany's Gross Domestic Product (GDP) in 2014 was \$3.868 trillion making it the largest national economy in Europe, the fourth-largest by nominal GDP in the world, and fifth by GDP (Purchasing Power Parity)⁶² while Nigeria's GDP in 2014 was \$568.5 billion making it the largest economy in Africa.⁶³ Moreover, there is a host of relevant differences between other aspects of the constitutional and political systems of Germany and Nigeria. Australia, India, and the United States are federations that have common law legal systems; while Nigeria, Canada, and South Africa have mixed legal systems that, in the field of public law, are predominantly common law in character. But Germany has a civil law system.⁶⁴ The prevailing legal system influences the institutions of government in a

⁵⁶ Cheryl Saunders, “Legislative, Executive, and Judicial Institutions: A Synthesis (Comparing Federations: Similarity and Difference)” in Katy Le Roy and Cheryl Saunders, eds., *Legislative, Executive, and Judicial Governance in Federal Countries* (Montreal & Kingston: McGill-Queen's Press, 2006).

⁵⁷ *Ibid.*

⁵⁸ The World Factbook, “Rank Order – Area” Central Intelligence Agency online: <<https://www.cia.gov/library/publications/the-world-factbook/rankorder/2147rank.html>> (accessed 23 June 2016).

⁵⁹ Cheryl Saunders, *supra* note 56.

⁶⁰ The World Factbook, *supra* note 58.

⁶¹ Cheryl Saunders, *supra* note 56.

⁶² World Bank Data, “Germany” World Bank Online: <<http://data.worldbank.org/country/germany>> (accessed 24 June 2016).

⁶³ World Bank Data, “Nigeria” World Bank Online: <<http://data.worldbank.org/country/nigeria>> (accessed 24 June 2016).

⁶⁴ Cheryl Saunders, *supra* note 56.

variety of ways. For example, legislative codes are the predominant source of law in Germany which operates a civil law system and is a parliamentary federation. In Nigeria which is a presidential federation, the law is derived from both legislation and judicial decisions. These constitutional and political differences inform the federal distribution of powers and have institutional impacts on the organization and operation of the courts, key agencies of government, and intergovernmental relations,⁶⁵ and by extension, the success of the energy security and climate change policy initiatives in both countries (Germany and Nigeria).

Moreover, during the last 100 years, the German energy and electricity systems have gone through extensive changes and reforms. However, “the energy transition in Germany can be understood as a politically driven process of structural changes in the energy system.”⁶⁶ The peculiar standard of the German energy transition, including the success of its energy and environmental policy agenda “results from the combination of political drivers and structural change.”⁶⁷ Therefore, Nigeria is advised to emulate Germany by formulating and implementing politically-driven structural and policy changes with a view to reforming its energy and electricity systems. By gleaning crucial lessons from Germany, Nigeria can determine and develop policy alternatives to break through the extremely polarised energy debate in the country. In Germany, there is a very strong political connection between bold and ambitious emissions reduction and renewable energy strategies on the one hand and the phase-out of nuclear power on the other hand, which is one of a number of specifics regarding the “German approach to the political decisions on a long-term energy transition to a decarbonised energy and electricity systems.”⁶⁸

By successfully incorporating climate change objectives into energy security policy, Germany’s renewable energy sector is among the most innovative and successful globally thus making Germany a model for renewable energy policy. Accordingly, because of Germany’s leadership in this area, there are many insights Nigeria can gain from Germany’s ambitious approach. The regulatory experiences in Germany provide relevant lessons for the advancement of the Nigerian

⁶⁵ *Ibid.*

⁶⁶ Natalie Fabra et al., *The Energy Transition in Europe: Initial Lessons from Germany, the UK and France – Towards a Low Carbon European Power Sector* (Brussels: Centre on Regulation in Europe, 2015) 48.

⁶⁷ *Ibid.*

⁶⁸ *Ibid.*

energy and electricity systems and the country's climate change objectives. The goal is demanding, but extremely rewarding. The government of Nigeria should understand that the transition to a decarbonised is a mandatory requirement to avoid dangerous climate change. Therefore, there is an urgent need to reform the power sector which is the backbone of the energy sector transformation given its distinctive potential to integrate climate-friendly and low carbon energy resources into the Nigerian economy.

4.4. Germany's Energy Security and Climate Change Initiatives

Unlike Nigeria, Germany is one of the most industrialized countries in the world, but it has very little in the way of natural mineral resources. Hence, Germany has had to rely on imports to satisfy 62 percent of its energy demand and almost 97 percent of the oil used in the country is imported.⁶⁹ Not unlike Germany, (and despite Nigeria's potential, as it has energy resource capacity that could easily exceed domestic demand), Nigeria relies on petroleum imports because of low refinery utilization rates.⁷⁰ And as discussed in Part 2.2, the ongoing inefficiency and challenges in Nigeria with respect to domestic oil meeting energy demand show no sign of abating. Accordingly, Nigeria, like Germany, faces energy security risks associated with reliance on imports, again keeping in mind however, that Nigeria's dependence on imports is not a matter of a lack of domestic natural resources but a matter of infrastructure and political failure. This of course begs the question of whether diversification and green energy innovation in Nigeria would be resistant or less vulnerable to the infrastructure and political shortcomings that have plagued the Nigerian energy industry for decades. While this question is tackled in more detail in Part 4.6 below, it is my view that it is the Nigerian energy industry's homogeneity and centralized supply system (i.e. over-dependence on fossil sources for its energy supply) that is at the root of its failure to achieve resilience and its overall failure to balance energy supply and demand.

⁶⁹ See The Federal Government of Germany, "Energy and Climate Protection Programme" online: The Press and Information Office of the Federal Government <<http://www.bundesregierung.de/Content/EN/StatischeSeiten/Schwerpunkte/Energie-der-Zukunft/einstiegsartikel-energie-der-zukunft.htm>> (accessed 3 May 2015).

⁷⁰ "The refineries chronically operate below full capacity because of operational failures, fires, and sabotage mainly on the crude pipelines feeding the refineries." US Energy Information Administration, "Country Analysis Brief: Nigeria" U.S. EIA Online: http://www.eia.gov/beta/international/analysis_includes/countries_long/Nigeria/nigeria.pdf (accessed 2 March 2016).

In addition to seeking overall energy independence, Germany was also acutely aware of the rise of carbon dioxide levels in the atmosphere and its impacts on climate change.⁷¹ Seeing this as an opportunity, German state/politicians decided it was essential for the future of Germany to ensure sustainable energy security without compromising climate security.⁷² The simultaneous focus of Germany's energy policy on energy security and climate change concerns furnished the impetus for innovation, export and employment based on energy security strategies that were efficient, safe, affordable, environment and climate-friendly.⁷³ Indeed, Germany's clean energy transition is understood first and foremost as energy security project, improving energy security and ensuring access at more affordable prices.⁷⁴

Although Germany had been working at climate change initiatives in the past,⁷⁵ it was in 2007 at Meseberg when the German Cabinet adopted its ambitious energy and climate scheme.⁷⁶ On 5 December 2007, the Cabinet submitted an inclusive collection of acts and ordinances relating to the integration of energy security and climate change objectives.⁷⁷ Implementation of the decisions reached in Meseberg began after further legislative proposals were made on 21 May 2008⁷⁸ and are described together as Germany's *Integrated Energy and Climate Programme*.⁷⁹

⁷¹ International Energy Agency, *Energy Policies of IEA Countries 2013 Review: Germany* (Paris: International Energy Agency Publications: 2013); Anne Power and Monika Zulauf, "Cutting Carbon Costs: Learning from Germany's Energy Saving Program" (2011) London School of Economics, Department of Housing and Communities (Building Knowledge and Sharing Solutions for Housing and Urban Policy) 20 online: <<http://sticerd.lse.ac.uk/dps/case/cp/CCCfull.pdf>> (accessed 3 March 2016).

⁷² Federal Government of Germany, "Energy and Climate Protection Programme" online: The Press and Information Office of the Federal Government <<http://www.bundesregierung.de/Content/EN/StatischeSeiten/Schwerpunkte/Energie-der-Zukunft/einstiegsartikel-energie-der-zukunft.htm>> (accessed 3 May 2015).

⁷³ *Ibid*; Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, *supra* note 52 at 2.

⁷⁴ Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, *supra* note 52 at 1; Cinnamon Piñon Carlarne, *Climate Change Law and Policy: EU and US Approaches* (Oxford: Oxford University Press, 2010).

⁷⁵ Robert Kunzig, "HOW DO WE FIX IT? Germany Could Be a Model for How We'll Get Power in the Future" National Geographic (15 October, 2015) National Geographic online: <<http://ngm.nationalgeographic.com/2015/11/climate-change/germany-renewable-energy-revolution-text>> (accessed 3 March 2016); Nicholas Herbert Stern, *The Economics of Climate Change: The Stern Review* (Cambridge: Cambridge University Press, 2007); The Economist, "Energy: When the wind blows" The Economist (28 November 2015) online: <<http://www.economist.com/news/special-report/21678955-renewable-power-good-more-renewable-power-not-always-better-when-wind-blows>> (accessed 3 March 2016); Kathryn Archer and John P. Banks, *American and German Approaches to Energy-Climate Policy* (2014) Brookings Institution online: <<http://www.brookings.edu/research/articles/2014/06/11-american-german-energy-policy-banks-archer>> (accessed 3 March 2016).

⁷⁶ Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, *supra* note 52 at 1.

⁷⁷ *Ibid*.

⁷⁸ *Ibid*.

Again, this package aims at efficient climate protection in the course of reforming the economy and society by ensuring that climate protection and mitigation is affordable and maintains pace with sustainable economic development.⁸⁰ As stated by the German government in 2007, “Efficient climate protection modernises the economy and society.”⁸¹

Germany’s *Integrated Energy and Climate Programme* is described as having three essential pillars:⁸²

- A coherent and unambiguous legal system/regime;
- Robust financial incentives through subsidies and loans provided by a Public Investment Bank;
- Campaigns by regional and local bodies to change behavior supported by enforceable standards, energy certificates, and backed by model projects across Germany.⁸³

As alluded to in point one immediately above, the primacy of the *Integrated Energy and Climate Programme* is backed by a wide range of legislation and ordinances for effective implementation. The legislation and ordinances are aimed at increasing use of renewable energies and improve efficiency – together which is anticipated to lower coal, oil and gas consumption in the heating, transport and electricity sectors, and in turn lead to an overall reduction in Germany’s reliance on energy imports.⁸⁴ Accordingly, through 14 legislative initiatives, prominence was placed on: boosting the energy performance and efficiency of buildings; the expansion of combined heat and power generation; increased renewables in the electricity and heat sectors; the expansion of offshore wind installations; and access to the natural gas grid for biogas.⁸⁵ Further, the programme creates essential incentives for modernization in energy and climate protection technologies.⁸⁶

⁷⁹ *Ibid.*

⁸⁰ Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, *supra* note 52 at 1.

⁸¹ *Ibid.*, <http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/hintergrund_meseberg_en.pdf> (accessed 5 February 2016).

⁸² *Ibid.*

⁸³ *Ibid.*; See also discussion in Anne Power and Monika Zulauf, *supra* note 71 at 8.

⁸⁴ Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, *supra* note 52 at 1.

⁸⁵ *Energy Industry Act*, Energy Act of 7 July 2005 (I, p. 1970, 3621), by Article 9 of the Law of 19 February 2016 (I, p. 254) has been changed (addressing consumer metering to allow consumers to monitor usage); *Combined Heat and*

In addition to seeking energy self-sufficiency and demonstrating that fighting climate change and energy security concerns simultaneously can be an effective strategy for both ends, a key aim of the German government in presenting this detailed plan of action was to influence and stimulate domestic and EU climate policy.⁸⁷ By implementing these initiatives, Germany sought to concurrently influence regional and international climate negotiations.⁸⁸ Germany sought this broader influence not only because of the requirement to comply with EU energy and climate regulations, but also because of a genuine political commitment to climate change mitigation

Power Act 2002, Act on the Retention, Modernisation and Extension of Combined Heat and Power Generation (CHP Act of 19th March 2002, amended on 21st December 2015) (promotes construction of combined heat and electricity grids); *Renewable Energy Sources Act*, Act on the Development of Renewable Energy Sources (Renewable Energy Sources Act - RES Act 2014) online: <http://www.bmwi.de/English/Redaktion/Pdf/renewable-energy-sources-act-eeg-2014,property=pdf,bereich=bmwi2012,sprache=en,rwb=true.pdf> (accessed 3 March 2016) (to increase renewables in the electricity sector and includes new provisions for regulating tariffs for offshore wind farms); *37th Ordinance on the Implementation of the Federal Emission Control Act* Thirty-Seventh Ordinance for the Implementation of the Federal Immission Control Act (Ordinance on Installations Requiring a Permit – 4. BImSchV) of 24 July 1985 (Federal Law Gazette I (1985), p. 1586), in the version of the announcement from 14 March 1997 (Federal Law Gazette I (1997), p. 504), as last amended by Article 13 of the “article law” (Artikelgesetz) of 11 August 2009 (Federal Law Gazette I (2009), p. 2723) (to reduce nitrous oxide emissions from power plants); (introduction of tighter energy efficiency standards); *Biofuel Quota Act* (1 January 2007, amended 17 September 2009) (amendments to *Energy Saving Ordinance* increase biofuels and reduction of GHGs) to achieve a 17% biofuels target by 2020; *Sustainability Ordinance*, Hans-Joachim Koch et al., “Germany”, in Richard Lord et al. eds., *Climate Change Liability*, 376-416 (Cambridge: Cambridge University Press, 2011) (setting minimum requirements for sustainable agricultural land and conservation of habitats); *Hydrogenation Ordinance*, Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, “The Integrated Energy and Climate Programme of the German Government” (2007) online: http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/hintergrund_meseberg_en.pdf (accessed 3 March 2016) (biogenic oils and blending quotas); *Fuel Quality Ordinance*, Hans-Joachim Koch et al., “Germany”, in Richard Lord et al. eds., *Climate Change Liability*, 376-416 (Cambridge: Cambridge University Press, 2011) (setting minimum requirements for sustainable agricultural land and conservation of habitats) (increased blending of bioethanol in petrol); *Gas Grid Ordinance* (biogas to be fed into natural gas grid); *Guidelines on the procurement of energy-efficient products and services*, Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, “The Integrated Energy and Climate Programme of the German Government” (2007) online: http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/hintergrund_meseberg_en.pdf (accessed 3 March 2016) (priority procurement for efficient appliances and services); *Renewable Energies Heat Act* (7 August 2008, amended 2009 and 2011) to create a statutory obligation to cover a percentage of heat demand from renewable energy sources. (obligations to use renewable energies in new buildings); Reform of vehicle tax to a pollutant and CO₂ basis (vehicle tax calculated on emissions efficiency); *Chemicals Climate Protection Ordinance*, Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, “The Integrated Energy and Climate Programme of the German Government” (2007) online: http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/hintergrund_meseberg_en.pdf (accessed 3 March 2016) (reduce fluorinated GHGs); For further discussion see, European Commission, “Environment – Germany” Environment Policy Review 124 online: <http://ec.europa.eu/environment/archives/pdf/policy/germany.pdf> (accessed 8 November 2015).

⁸⁶ *Ibid* at 2.

⁸⁷ Cinnamon Piñon Carlarne, *supra* note 74 at 211.

⁸⁸ *Ibid* at 212.

with the desire to be an EU and international leader.⁸⁹ Therefore, Germany has always been interested in pushing for an “ambitious, comprehensive and binding” global agreement on cutting carbon emissions in order to create impetus for an inclusive deal notwithstanding resistance from some developing and emerging economies.⁹⁰

Indeed, Germany has long been laying the groundwork with a view to influencing a commitment to decarbonisation, not just with the G7 agreement earlier in 2015, but also by bringing Brazil on board, which broke with the idea that decarbonisation should only be a goal of developed economies.⁹¹

In 2008, having formally and politically committed itself to aggressive climate change mitigation strategies, the government of Germany presented a detailed *Climate Protection Initiative* comprising a collection of four laws.⁹² At that time, as of 2008, Germany had already achieved a 20% reduction in carbon emissions and anticipated that the four new laws would further facilitate at least 10% reduction in GHGs emissions.⁹³ The June 2008 climate change initiative was designed with the objectives of reducing carbon emissions by 40% below 1990 levels by 2020 and promoting the implementation of effective adaptation programs.⁹⁴

⁸⁹ Harriet Torry, “Germany, France to Push for Ambitious U.N. Climate Agreement at Paris Summit” *The Wall Street Journal* (19 May 2015) *The Wall Street Journal* online: <<http://www.wsj.com/articles/germany-france-to-push-for-ambitious-u-n-climate-agreement-at-paris-summit-1432051898>> (accessed 4 March 2016).

⁹⁰ *Ibid.*

⁹¹ But there is still resistance even within the EU from Poland, and everything may still hang on whether Angela Merkel (Chancellor of Germany) can persuade the country’s new president. Sören Amelang and Kerstine Appunn, “COP21 - Media on Germany and the Paris Climate Summit” *Clean Energy Wire* (15 December 2015) *Clean Energy Wire* online: <<https://www.cleanenergywire.org/factsheets/cop21-media-germany-and-paris-climate-summit>> (accessed 4 March 2016).

⁹² Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, “Federal Government Minister Gabriel Launches 400 Million Euro Climate Protection Programme” (19 June 2008) online: <<http://www.bmub.bund.de/en/press/press-releases/detailansicht-en/artikel/federal-environment-minister-gabriel-launches-400-million-euro-climate-protection-programme/>> (accessed 27 September 2015).

⁹³ Cinnamon Piñon Carlarne, *supra* note 74 at 212; Louise Osborne, “German renewable energy drive brings emissions cuts success” *The Guardian* (26 November 2012) *The Guardian* online: <<http://www.theguardian.com/environment/2012/nov/26/german-renewable-energy-emission-co2>> (accessed 5 March 2016).

⁹⁴ *Ibid.*

The 2008 *Climate Protection Initiative* incorporates provisions aimed at: increased efficiencies in heating and power generation plants;⁹⁵ increased renewable electricity content through increased wind energy capacity;⁹⁶ improved insulation and energy efficiency in buildings;⁹⁷ encouraging shift from solar energy to wind power development.⁹⁸

The integrated impact of the four climate change laws led to the promotion of energy efficiency and increment in the use of green energy for production of electricity.

Apart from energy efficiency, Germany also directed its initiative towards a number of additional items needed for its successful implementation including infrastructure and funding. For example, on 21 August 2009, the government of Germany enacted the *Power Grid Expansion Act*⁹⁹ to accelerate the expansion of Germany's transmission grids. The intent of the Act described 23 projects given "absolute priority" for future power supply and also regulated the use of high voltage underground cables in the transmission grid.¹⁰⁰ The *Energy and Climate Fund Act*¹⁰¹ was enacted in 2010 to create the Energy and Climate Fund to be used for the promotion of an environmentally-friendly, reliable and affordable energy supply with respect to energy-efficiency. Revenue for this fund would mainly come from a contractual agreement between nuclear power plant operators and the German state which would receive a portion of their extra profits.¹⁰²

⁹⁵ These measures were designed to increase the number of combined heat and power generation plants, facilitating competition among electricity and gas meter reading companies, and thereby stimulating tele-heating, where power stations' pipes supply water into homes. *Ibid* at 213.

⁹⁶ These measures plan to double renewable electricity content to 30% by 2020, focusing particularly on improving wind energy capacity. *Ibid* at 212.

⁹⁷ This initiative comprises provisions to promote improved insulation and energy efficiency in private buildings and public facilities. *Ibid*.

⁹⁸ This initiative aimed at limiting cross-subsidies for photovoltaics due to a shifting focus on wind power. *Ibid*.

⁹⁹ *Power Grid Expansion Act*, (EnLAG) (21 August 2009).

¹⁰⁰ Cinnamon Piñon Carlarne, *supra* note 74 at 7.

¹⁰¹ *Energy and Climate Fund Act*, Act amending the Act to establish a special energy and climate fund (17 October 2011) online: <<http://weg.ge/wp-content/uploads/2013/05/Germanys-Energy-strategy-and-policy-presentation-2011.pdf>> (accessed 4 March 2016).

¹⁰² The *Carbon Capture and Storage Act* was also enacted on 24 August 2012 to ensure a permanent storage of CO₂ in underground rock layers by protecting humanity and the environment with a view to taking the responsibility for future generations into consideration. The law currently regulates the exploration, testing and demonstration of the permanent CO₂ storage technology. It is the national-level implementing legislation for the EU Directive on the geological storage of CO₂. It provides for an annual storage of no more than 1.3m tons of CO₂ and a maximum storage capacity of 4m tons of CO₂ per year in Germany. For further details, see, Cinnamon Piñon

In 2010, the German government also launched its “Energy Concept for an Environmentally Sound, Reliable and Affordable Energy Supply”¹⁰³ which included an extension of the operation of its nuclear reactors (by an average of twelve years) and the radical promotion of energy generation from renewable sources.¹⁰⁴ Subsequent to the 2011 Fukushima nuclear and radiation accidents in Japan however, the German government re-evaluated “the risks associated with nuclear power and decided to return to phasing out nuclear energy by 2022.”¹⁰⁵ The government revised the *Atomic Energy Act*¹⁰⁶ in 2011 to put these changes into law.¹⁰⁷ After the 2013 elections, Germany’s new coalition government aimed at sustaining momentum towards achieving the voluntary emission reduction targets for 2020 and implementing the ‘Energiewende’ (which focuses on energy efficiency and renewable energy).¹⁰⁸

Carlarne, *supra* note 74. Also, the *Energy Consumption Labelling Act* enacted in 1997 but most recently amended on 17 May 2012 provides the basis for energy labelling (i.e. of products) in Germany. It stipulates the labelling requirements for products with regard to their energy consumption, consumption of other important resources, and their carbon footprint. This may take the form of labels indicating consumption, product information, or advertising information. The 2012 amendment transplants the EU Energy Labelling Directive into national law. It introduces new classes of labelling (previously only A-G, now up to A+++), and introduces an amendment that means that not only energy-consuming equipment, but also energy-related products, which themselves do not consume energy, but can have great influence on energy consumption, are marked with the EU energy label. See, Federal Ministry of Economics and Technology, “Germany’s new energy policy: Heading towards 2050 with secure, affordable and environmentally sound energy” (2012) online: <<http://www.bmwi.de/English/Redaktion/Pdf/germanys-new-energy-policy>> (accessed 28 September 2015).

¹⁰³ Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), *Energy Concept for an Environmentally Sound, Reliable and Affordable Energy Supply* (Berlin: Federal Ministry of Economics and Technology (BMWi) Public Relations, 2010) online: <<http://www.bmwi.de/English/Redaktion/Pdf/energy-concept,property=pdf,bereich=bmwi,sprache=en,rwb=true.pdf>> (accessed 4 March 2016).

¹⁰⁴ Michal Nachmany et al., “Climate Change Legislation in Germany” in Michal Nachmany et al., eds., *The 2015 Global Climate Legislation Study A Review of Climate Change Legislation in 99 Countries* (London: The London School of Economics and Political Science Graham Research Institute on Climate Change and the Environment, 2015) 4.

¹⁰⁵ *Ibid.*

¹⁰⁶ The “Act on the Peaceful Utilisation of Atomic Energy and the Protection against its Hazards” - the Atomic Energy Act - became effective on 1st January 1960. It has since been amended and supplemented several times. Last amendment: July 2011. The purpose of the Atomic Energy Act is (1.) to phase out the use of nuclear energy for the commercial generation of electricity in a structured manner, and to ensure on-going operation up until the date of discontinuation, (2.) to protect life, health and material goods against the risks of nuclear energy and the harmful effects of ionizing radiation and to compensate for damage caused by nuclear energy or ionizing radiation, (3.) to avoid a risk to the internal or external security of the Federal Republic of Germany through the application or release of nuclear energy, (4.) to ensure that the Federal Republic of Germany meets its international liabilities in the field of nuclear energy and radiation protection.

¹⁰⁷ Michael Nachmany et al. *supra* note 104 at 4.

¹⁰⁸ Michael Nachmany et al. *supra* note 104 at 3.

By 2014, Germany was ranked as the most energy efficient country in the world by the American Council for an Energy Efficient Economy (out of 16 countries studied).¹⁰⁹ That same year, the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety published the *Action Programme on Climate Protection 2020* which was adopted by cabinet. The *Action Programme* contains measures to be implemented by 2020 in order to accomplish Germany's goal set to cut GHGs by at least 40% compared with 1990 levels. It comprises the following principal components:

- National Energy Efficiency Action Plan (NAPE).
- Strategy on climate-friendly building and housing.
- Measures in the transport sector.
- Reduction in non-energy related emissions in industry, commerce/trade/services, waste management, and agriculture.
- Emissions trading reform
- Further measures, especially in the electricity sector

The action programme would lead to a reduction of 62m-78m tonnes carbon equivalent in 2020 compared with the current projection for 2020. Further, 3m-4m tonnes could be saved through soft, cross-sectoral measures meaning that the programme could result in a total reduction of 82m tonnes.¹¹⁰ Notwithstanding the global economic recession, diminishing global and domestic enthusiasm, the government of Germany has thus far continued to press forward with ambitious integrated climate and energy initiatives and objectives.

Regulation and implementation of the integrated energy and climate policy and its associated initiatives are divided among the EU, the German federal government, the 16 federal states, and the more than 12,300 municipalities. This multi-level system of governance has worked well in policy making related to energy security and climate change principally because of the defined coordination/cooperation and long-standing cooperation that exists among the various levels.¹¹¹ The combined impact of Germany's past and current climate measures discloses a record of

¹⁰⁹ Michael Nachmany et al. *supra* note 104 at 5.

¹¹⁰ Michal Nachmany et al., *supra* note 104 at 10.

¹¹¹ Anne Power and Monika Zulauf, *supra* note 46 at 82.

significant favourable outcome and immense prospects mixed with equally ample challenges.¹¹² Based on the figures released by the Federal Environmental Agency, GHG emissions in Germany in 2007 were 22.4% below emissions in the Kyoto base year (1990/1995), while GHG emissions in 2008 were at their lowest level since 1990.¹¹³ On 29 March 2009, Germany made a declaration that it had successfully reached its commitment under the Kyoto Protocol and the EU-15 bubble of reducing GHG emissions by 21% by 2008-2012 as against 1990 levels.¹¹⁴

Also, Germany is pushing efforts to promote the EU Emissions Trading Scheme through increased auctioning of allowances and it is aiming to become a world leader in providing global adaptation and mitigation aids and measures.¹¹⁵ This success though laudable is still not enough. For instance, Cass Sunstein argues that successful emission reductions are not entirely based on the climate mitigation measures Germany has adopted and implemented, but they are also somewhat “attributable to low temperatures, economic recession, and political reunification.”¹¹⁶ Therefore, Germany continues to design and implement initiatives to incrementally restructure its energy industry with special focus on energy reforms with a view to opening its energy markets to competition and creating new opportunities for renewable energy development through commitment to climate change targets – and vice versa.

The collaborative effect of the laws, policies and initiatives will be to promote “energy efficiency and increase the uptake of green energy for electricity production”¹¹⁷ and to particularly strengthen the pillars of German Climate Protection Program through a coherent and unambiguous legal system and a robust financial incentives with subsidies and loans provided by a Public Investment Bank and campaigns by regional and local bodies to change behavior sustained by enforceable standards, energy certificates, and supported by the development of model projects across Germany. To a great extent, achieving the three pillars¹¹⁸ of German

¹¹² Cinnamon Piñon Carlarne, *supra* note 74 at 213.

¹¹³ *Ibid.*

¹¹⁴ *Ibid.*

¹¹⁵ BMU, “The International Climate Initiative of the Federal Republic of Germany” (November 2009) Online: http://www.bmu.de/files/english/pdf/application/pdf/brochure_iki_en_bf.pdf (accessed 7 March 2016).

¹¹⁶ Cass R Sunstein, “Of Montreal and Kyoto: A Tale of Two Protocols” (2007) 31:1 Harvard Environmental Law Review 27 online: http://www.law.harvard.edu/students/orgs/elr/vol31_1/sunstein.pdf (accessed 7 March 2016).

¹¹⁷ Cinnamon Piñon Carlarne, *supra* note 60 at 213.

¹¹⁸ The German Climate Protection Program is based on the three pillars: (1.) A clear, legal framework and tight regulation at federal level; (2.) Strong financial incentives through subsidies and loans, via a public investment

Climate Protection Program is vital to success in terms of implementation of the country's integrated energy security and climate change policy and initiatives.

Turning expressly now to the matter of energy security from the German perspective.

4.5. German Energy Security

4.5.A. Definition of Energy Security

The combined impact of the laws, integrated energy security and climate change policy and initiatives, and the three pillars of German Climate Protection Program (as described immediately above) address important aspects of energy security which include the following: source of risks/threats; scope of impacts; severity of impacts; responding to impacts; addressing supply and demand balance; addressing energy insecurity; resilience; and independence etc. The review above also reveals that the primary focus of Germany's integrated energy security and climate change policy and initiatives is the *energy independence* and system *resilience* and the maintenance of the balance between energy *supply and demand*.

Indeed, Germany has relied heavily on oil and gas imports because it has very little domestic oil and natural gas production.¹¹⁹ It has well diversified and flexible oil and natural gas supply infrastructure, which comprises crude, product and gas pipelines and crude and oil product import terminals. Importation of natural gas into Germany is done exclusively by cross-border pipeline.¹²⁰ Oil consumption has declined significantly since the 1970s but continues to be the primary source of energy in Germany. As at 2012, oil represents approximately 32% of Germany's total primary energy supply.¹²¹ The share of natural gas in Germany's total primary energy supply is presently around 22% and natural gas consumption in the country has declined by 10% since 2006.¹²² Coal also declined markedly from 42% of total primary energy supply to 24% between 1973 and 2010. Oil and coal consumption have been reduced by a combination of

bank; (3.) Campaigns to change behaviour, involving regional and local bodies, backed by enforceable standards, energy performance certificates, and supported model projects throughout Germany. See, Anne Power and Monika Zulauf, *supra* note 46 at 8.

¹¹⁹ International Energy Agency, *Germany: Oil and Gas Security Emergency Response of IEA Countries* (Paris: International Energy Agency, 2012) 3.

¹²⁰ *Ibid.*

¹²¹ *Ibid.*

¹²² *Ibid.*

natural gas, nuclear and renewables. The share of nuclear energy and renewables increased from an insignificant 1% each to 11% each during the same period.¹²³

On the basis of prevailing government policies and law as discussed, the movement towards increasing share of renewables in total primary energy supply is set to continue. The Energy Concept 2010 established a target for Germany to increase its share of electricity generated from renewable sources to at least 35% of total consumption by 2020.¹²⁴ However, as has also been noted, any trend towards an increasing share of nuclear in the energy mix appears set to reverse since the 2011 government announcement of its decision to phase out all German nuclear power plants by the end of 2022 in response to the Fukushima nuclear disaster.

Taken together, energy security in Germany can be defined as the ability of the German economy to provide sufficient, affordable and environmentally sustainable energy services so as to increase energy independence and maintain maximum welfare of the state.¹²⁵

4.5.B. Energy Security Policy Objectives: A Closer Look at Independence through Renewables

Germany's focus is on the total transformation and diversification of its energy supplies which will result in an exceptional reduction in the country's reliance on foreign oil and gas imports, while *simultaneously* addressing climate change by reducing carbon emissions. Therefore, Germany has been pursuing a strategy for more energy independence, and thus, for more energy security by prioritizing domestic renewable energies.¹²⁶ The point being made here is that by embracing climate change challenges (calling for GHG mitigation strategies) Germany has found a solution (transition to renewables) that could solve not only its enduring energy security concerns (independence, accessibility and affordability) but also reduce energy security risks in the future posed by projected climate change events. Accordingly, as put by Lisa Schmid, "Germany's energy transition significantly improves the country's future energy security while

¹²³ *Ibid* at 4.

¹²⁴ *Ibid*.

¹²⁵ This definition is an extension of a definition articulated by Luiz and Legey in Helcio Blum Luiz & FL Legey, "The Challenging Economics of Energy Security: Ensuring Energy Benefits in Support to Sustainable Development (2012) 34 Energy Economics 1982 [Luiz & Legey].

¹²⁶ Lisa Schmid, *Germany's Energy Transition: a Blueprint for European Energy Security?* (Washington, D.C.: Heinrich Böll Stiftung, 2014) III.

ensuring universal energy access at affordable prices”.¹²⁷ Germany’s clean energy transition is thus, above all, a national security project defined by climate and energy security objectives.

On the other hand, it is feared that the clean energy transition could weaken the stability of Germany’s energy security as power supplies from intermittent renewable energy sources, such as wind and solar, are more volatile than that from conventional fossil fuel sources.¹²⁸ Consistent power supply lies at the core of Germany’s economic policy since its impressive industry relies on secure and uninterrupted energy supplies to operate. Presently, renewable energy sources make up 28% of Germany’s electricity mix without jeopardizing energy security in any form.¹²⁹ Furthermore, Germany describes itself having the most reliable grid system in the world.¹³⁰

Global energy experts agree that natural gas plays a potential role as a transitional fuel within the shift towards a low carbon energy future as it provides a flexible power source which can counter the intermittency of renewables.¹³¹ While gas has been acknowledged to remain in the European primary energy mix within the long term, the extent to which natural gas plays a role has not been given sufficient attention.¹³² For example, in 2013, more than four-fifths of the gas consumed in Germany (in addition to 11% German domestic gas) was imported from Russia (31%), Norway (24%), the Netherlands (23%), Denmark and Great Britain (together 11%). This situation seems to cast doubt on the vision of energy independent and self-sufficient Germany and its energy transition goals.¹³³ However, this only holds true for the short-term, a 2014 study by the German Fraunhofer Institute claims that Germany can, in fact, be independent from Russian gas as soon as 2030 and be completely free from foreign gas imports by 2050 by increasing its energy efficiency in the heating sector significantly and implementing alternative heating methods such as heat pumps, as well as developing renewable gas substitutes such as

¹²⁷ *Ibid.*

¹²⁸ *Ibid.*

¹²⁹ *Ibid* at IV.

¹³⁰ Peter Fairley, “Germany’s Grid: Renewable-Rich and Rock-Solid” IEEE Spectrum (28 August 2014) online: <http://spectrum.ieee.org/energywise/energy/the-smarter-grid/germanys-superstable-solarsoaked-grid> (accessed 28 October 2015).

¹³¹ Carlo Carraro et al., “The Optimal Energy Mix in Power Generation and the Contribution from Natural Gas in Reducing Carbon Emissions to 2030 and Beyond.” Discussion Paper 2014-63 (Cambridge, Mass.: Harvard Project on Climate Agreements, January 2014) 3.

¹³² *Ibid.*

¹³³ Lisa Schmid, *supra* note 126 at IV.

biogas and power-to-gas.¹³⁴ Therefore, gas independence for Germany is a feasible goal, if the country ambitiously pursues this objective.

Accordingly, in addition to the development of renewables, the promotion of energy efficiency is also central to Germany's primary energy security policy objective of independence. The need for gas (imported or domestic) could be reduced relatively quickly through the enhancement of energy efficiency. Germany has set the target of reducing its electricity consumption by 25% by 2050 compared to the 2008 level.¹³⁵

In terms of the apparent secondary objectives of increased *system resilience* (contemplation of threats and responding to threats) and *balancing supply and demand*, Germany's implementation of the transition to renewable energy involves the development of a more flexible energy system with decentralized supply and demand.¹³⁶ Allowing the evolution of a decentralized energy infrastructure also means reconsideration of the traditional energy producer and consumer model as citizens, cooperatives and municipalities produce and consume energy concurrently.¹³⁷ In fact, one in every sixty Germans now produces energy. By the end of 2013, there were 888 registered energy cooperatives in Germany, twice as many as in 2010. These decentralization developments enhance energy security because a decentralized system is even more resilient to external shocks than a centralized system.¹³⁸ Even with an increasing influx of intermittent renewable energy, the German grid remains one of the most reliable grid systems in the world. The objective here is for Germany to increasingly become a scattered landscape of "energy islands" independent from centralized facilities, some only for short periods of time, some permanently.¹³⁹ However, practically speaking, ongoing investment in smart grid technologies and energy efficiency as well as energy services is needed to guarantee the success of such a transition.

4.6. Revised Integrated Definition of Energy Security for the Nigerian Context

4.6.A. Review of the Preliminary Integrated Definition

¹³⁴ *Ibid.*

¹³⁵ *Ibid.*

¹³⁶ *Ibid.*

¹³⁷ *Ibid.*

¹³⁸ *Ibid* at V.

¹³⁹ *Ibid.*

At the end of Chapter Three, the following preliminary definition of energy security was proposed:

Energy Security: the capacity of the Nigerian economy to ensure sufficient energy resource supply availability and accessibility in an economically sustainable and timely way at reasonable cost through a reliable energy distribution networks, free from grave threats of supply service disruption, with a main focus on furthering economic growth (without compromising environmental standards) suitable for the present (economic climate) and the predictable future.

The preliminary definition was developed through the lens of *energy insecurity* due to Nigeria's particular energy challenges (as discussed) which include considerations related to: securing *short-term availability, accessible and affordable supply; supply interruption accommodation; infrastructure development; energy independence*; and the need to move beyond *short-term responses* into *long-term sustainable strategies* which would include diversification, environmental considerations and the establishment of an optimal energy resource mix.

I determined this preliminary definition to be quite limited and incapable of addressing Nigeria's ongoing energy security problems. While the definition recognizes the relationship between energy security and economic growth and also entertains environmental considerations (including climate change considerations) it is not sufficient to solve Nigeria's ongoing energy security problems because it doesn't expressly recognize the relationship between energy security and climate change – a particular threat to Nigeria. Further, because Nigeria's conception of energy security remains largely an economic conception of energy security, economic objectives are likely to continue to predominate over environmental objectives. Accordingly, it is unsurprising that although environmental and climate change considerations have been part of Nigeria's energy security policy objectives (for example, under NEP, 2013 as earlier discussed) no actual environmental and climate change initiatives have been implemented to date¹⁴⁰ nor have Nigeria's energy security problems been resolved.

Accordingly, the author revised the first definition to propose the following integrated definition of energy security:

¹⁴⁰ See Energy Commission on Nigeria, *National Energy Policy* (Abuja: Federal Republic of Nigeria, 2003) at Chapters One, Two, Three, Four, Five, and Six. See also discussion in SO Oyedepo, "Towards Achieving Energy for Sustainable Development in Nigeria" (2014) 34 *Renewable and Sustainable Energy Reviews* 266.

Energy Security: the production of adequate energy mix, from the sufficient energy reserves and resources made constantly available, accessible and affordable channeled through a reliable energy distribution systems in a climate-friendly and economically viable manner with renewables' exploration and utilization at its core based on the recognition of the need to further economic growth without compromising energy sector or climate change objectives.

This definition grounds the long sought after balance of supply and demand and diversification (in order to address interrupted supply and reduce over-reliance on current homogenous energy generation via oil and gas sector) by expanding the narrow *short-term* view of energy security through a *long-term* balancing of economic objectives with environmental/climate change objectives. In other words, diversification through renewables - a *long-term strategy* - can be achieved by leveraging climate change objectives whether arising from global climate change risk regulation, the simple understanding of climate change impacts as threat, or the long accepted natural resources management principle of sustainability.¹⁴¹

4.6.B. Limitations of the Preliminary Integrated Definition?

It is the author's view that *energy security* is the principal means through which both climate change and energy sector objectives could be best promoted in Nigeria and that an integrated definition or perspective on energy security can assist in provoking diversification and green energy innovation in Nigeria which in turn could help solve Nigeria's energy supply problems.

However, given that Nigeria's ongoing domestic energy problems are less related to the lack of domestic energy (recall that Nigeria is an energy exporter and has a high percentage of renewable energy sources) and more related to persistent infrastructure failings and political shortcomings that have plagued the Nigerian energy industry for decades, would an integrated approach to energy security even make a difference? In other words, can an integrated approach to energy security provide practical solutions to Nigeria's ongoing energy problems?

¹²⁷ Sustainability simply means the ability to continue a defined behavior endlessly; Herman Daly defines Environmental sustainability as "the rates of renewable resource harvest, pollution creation, and non-renewable resource depletion that can be continued indefinitely. If they cannot be continued indefinitely then they are not sustainable". See HE Daly, "Boundless bull" (1990a) 4:3 Gannett Center Journal 113-118; HE Daly, "Towards some operational principles of sustainable development" (1990b) 2 Ecological Economics 1-6. See also Daniel R. Lynch, *Sustainable Natural Resource Management for Scientists and Engineers* (New York: Cambridge University Press, 2009).

4.6.C. Lessons from Germany and a Revised Integrated Definition

Based on the discussion in Part 4.5 above, it is apparent that Germany's underlying or chief objective in terms of energy security (recall Germany is an energy importer) is to achieve a high level of energy *independence*. Germany's solution to achieving *independence* is to diversify its energy production through the development of a variety of renewables¹⁴² advanced and supported by various pieces of legislation, the development of decentralized infrastructure and commitment of financial resources to achieve that infrastructure. Also key to achieving independence are initiatives aimed at increasing energy efficiency domestically.

A secondary objective for Germany is to increase *system resilience* by contemplating threats and developing responses to those threats. So not only is Germany expanding its renewables (to achieve independence) it is expanding renewables through a decentralized energy infrastructure where citizens, cooperatives and municipalities produce and consume energy concurrently. Again this promotes resilience as a decentralized and diverse infrastructure is more flexible and adaptable for responding to threats (known or unknown).

Germany's goal to be a global leader in climate change mitigation strategies including advancing green technologies (and concomitant reduction in GHG emissions), perhaps with a view to positioning itself as an energy exporter in the future, appears to be a tertiary goal.

The point here is that the addressing of climate change risk has provided Germany with a solution to traditional and more typical energy problems.

While it is true that Nigeria has also been reliant on imports,¹⁴³ it cannot be said that Nigeria's principal goal with respect to energy security is the achievement of energy *independence* like Germany. Indeed, Nigeria's situation is wholly different from Germany in that Nigeria could have already achieved energy independence through efficient exploitation of its abundance of natural resources.¹⁴⁴ Therefore Nigeria's apparent promotion of diversification in its laws and policies¹⁴⁵ is aimed at energy security reasons other than *independence per se*. Rather, as

¹⁴² Lisa Schmid, *supra* note 126 at III: Germany has been pursuing a strategy "for more energy independence, and thus, for more energy security by prioritizing domestic renewable energies."

¹³⁰ See discussion in Part 2.2.A (Chapter 2) of this thesis.

¹⁴⁵ See discussion on NEP, 2003 and NEP, 2013 in Part 2.2.B. (Chapter 2) and Part 3.2.B.ii (Chapter 3) of this thesis.

discussed above, Nigeria's principal objective is to rectify interrupted supply and to make that uninterrupted supply *available, accessible and affordable* by reducing over-reliance on current homogenous energy generation through the achievement of an optimal energy resource mix – in other words, *diversification*. For Germany then diversification is the tool identified to achieve *independence*; for Nigeria, diversification is a tool to achieve *uninterrupted supply* over the *long-term*. Diversification in the form of renewables in turn advances climate change objectives, and thus obliging climate change risk regulation can promote diversification through renewables.

Despite the fact that diversification is aimed at different energy security goals, the Germany experience provides some interesting additional factors for consideration within the Nigerian context.

First, including climate change as part of its national security project and aligning with climate change initiatives as Germany has done could provide the necessary organizing force for Nigeria to achieve clarity in its legal system and subsequent policy initiatives. As earlier stated, “[e]fficient climate protection modernises the economy and society”.¹⁴⁶ On the other hand, any initiatives would have to be financially supported. Like Germany, however, this could be strategically accomplished through the establishment of standards and the use of model projects across Nigeria.

Secondly, in order to be successful in achieving reform through diversification, an integrated definition of energy security for use in the Nigerian context would have to be applied with flexibility on an industry-by-industry basis. The Germany experience reveals that a successful transition to diverse renewable energy supply involves the development of a more flexible energy system with decentralized supply and demand. Given the chronic energy infrastructural gaps and given that part of the response already emergent in Nigeria is that households and business enterprises are independently and concurrently producing and consuming energy (though often with non-renewable sources) to fill those gaps, a decentralized approach to energy supply and distribution in Nigeria could very well increase the chances of a successful transition

¹⁴⁶ The Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, (German: Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit), “The Integrated Energy and Climate Programme of the German Government” (2007) Online: <http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/hintergrund_meseberg_en.pdf> (accessed 27 March 2016).

to diverse renewable energy supply. The objective here for Nigeria to determine which of these independent “energy islands” would be appropriate for intermittent or short term use and which would be appropriate for longer term or more permanent use. The use of model projects appears to align well with advancing a decentralized approach.

Third, given the abundance of natural gas in Nigeria, Nigeria is well placed to use natural gas as a transitional fuel during the development of renewable energy supplies. It is important to note that there may be additional challenges in relying on natural gas as a transitional fuel, as Nigeria has still not optimized its natural gas resources/reserves caused by irresponsible gas flaring.¹⁴⁷

Finally, by effectively implementing these initiatives extracted from Germany’s integrated approach to energy security and climate change, Nigeria has the potential to concurrently influence regional and international climate negotiations. Given Nigeria’s genuine political commitment to climate change apparent from its most recent commitments (discussed further in the addendum to this thesis), it does appear to be the case that Nigeria could indeed leverage climate change risk regulation to mobilize its domestic transformation to a clean, secure and prosperous future through the renewable path to energy security.

Based on the foregoing discussion, and recognizing that it is not the attempted comprehensiveness of a national energy policy that would lead to energy security in any nation but rather the implementation of worthwhile policies, using effective strategies,¹⁴⁸ the author proposes the following revised integrated energy security definition for Nigeria:

Energy Security: the production of adequate energy mix from sufficient energy reserves and resources with renewables’ exploration and utilization as its core:

- made constantly available, accessible and affordable;
- channeled through reliable energy distribution systems that promote energy efficiency, green energy technology, production of electricity through flexible energy systems and the investment in decentralized energy infrastructure for effective supply and demand;
- recognizing equal treatment of climate and energy issues before the law and the need to further economic growth without compromising energy sector or climate change objectives; and

¹⁴⁷ See discussion in Part 2.2.B and 2.2.C of Chapter 2.

¹⁴⁸ R. C. Okeke, E. M. C. Izueke, and F. I. Nzekwe, “Energy Security and Sustainable Development in Nigeria” (2014) 4:3 *Arabian Journal of Business and Management Review* (OMAN Chapter) 70.

- with a view to considering Nigeria's clean energy transition as a national security project defined by climate protection and energy security objectives.

Further, promotion of energy security and climate change objectives should engender defined coordination and cooperation among the various levels of government in Nigeria by allowing the evolution of a decentralized energy infrastructure which also means reconsideration of the traditional energy producer and consumer model to allow citizens, cooperatives and local councils in Nigeria to produce and consume energy simultaneously.

In addition to demonstrating a transition from energy *insecurity* to the concept of *resilience*, this definition also introduces a systems-based approach built on the principle of *climate-energy sovereignty* as a legal framework. In other words, *climate-energy sovereignty* emphasizes the equal treatment of climate and energy issues before the law and energy issues should not be made to undermine climate issues and vice versa. Integrating climate change policies with energy policies is a prerequisite for the necessary certainty and confidence required to promote energy security and climate change mitigation. Therefore, energy security policies and laws ought to be rooted in climate protection principles; this cannot be achieved if they are framed in too disjointed a manner. The concept of *climate-energy sovereignty* ensures that energy security and climate protection policies have a secure area of autonomy and have settled expectations by having their objectives pre-established and enforced by law in an integrated manner.

4.7. Resilience and Climate-Energy Sovereignty: a new legal framework

This chapter examines the Germany's Integrated Energy and Climate Programme, including the various strategies designed and implemented by Germany to achieve a reasonable level of energy security while advancing climate change objectives. The chapter demonstrates that Germany identifies that climate change is one of the greatest challenges of our time and is taking ambitious steps to further its energy security and climate change objectives simultaneously and in a deliberate, strategic manner. It also demonstrates that Germany is keen to achieve energy *independence* and thus further concretizes the link between climate change and energy security when it comes to development of national energy policy. Around the world, Germany is leading a clarion call that urgent steps be taken to curb greenhouse gas emissions and mitigate climate change through diversification of renewable energy resources and investment in renewable energy and energy-efficient technologies. Accordingly, governments of the world have agreed to

limit average global warming to less than 2° Celsius. In Paris at the end 2015, governments had the opportunity to put in place a longer-term framework to achieve this by agreeing to a new universal climate change agreement.¹⁴⁹

Global transitioning to a climate-neutral, clean energy economic model needs to occur soon. It is already delivering enormous benefits in Germany where such transformation has begun. The analysis, as illustrated by Germany's example through its Integrated Energy and Climate Programme, shows that strong and coordinated domestic policies, laws and incentives encourage more ambitious climate action now and in the immediate future. The trend of passing climate legislation and formulating integrated energy and climate policies continues in Germany with emission reduction targets up to 2050, anchored in pragmatic laws and policies and approximately 70 per cent of the study countries have framework laws or policies to address the dual challenges of energy insecurity and climate change. The analysis also explores a set of strategies designed and implemented by Germany to tackle energy security and climate change concerns that with modification and refinement could be incorporated into the Nigerian context.

Overall, the contents of Germany's Integrated Energy and Climate Programme provide insights and motivation for Nigeria to increase and promote its energy security and climate mitigation ambitions/objectives. Implementation of such an ambitious integrated energy security and climate change policy framework in Nigeria will enable the country to address its critical energy security challenges, while also making great contributions towards meeting the global two-degree Celsius goal. It is my hope that the global challenge of climate change and the domestic dynamics of the Nigerian energy industry and deep *energy insecurity* will combine with impending resource scarcity to increase the burden on Nigerian policymakers to intensify the nature of government efforts in order to control and harness renewable energy sources with a view to serving state interests by integrating climate change responses with energy policy objectives. The present challenge lies in capturing the range of complex and interrelated dimensions encompassed in Nigerian energy systems. In response, the author would propose a systems-based approach built on the principles of *resilience* and the author describes as *climate-*

¹⁴⁹ Michal Nachmany et al., *The 2015 Global Climate Legislation Study A Review of Climate Change Legislation in 99 Countries* (London: The London School of Economics and Political Science Graham Research Institute on Climate Change and the Environment, 2015) online: <http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/Global_climate_legislation_study_20151.pdf> (accessed 27 March 2016).

energy sovereignty - a legal framework for investigating these dynamics and assessing their impact on both energy security and climate resiliency.

Having now examined and reviewed Germany's Integrated Energy and Climate Programme and the bold initiatives taken and implemented by Germany with the purpose of tackling energy security and climate change concerns simultaneously and the useful lessons/insights Nigeria can glean from Germany's integrated energy and climate model, we now turn to the concluding Chapter Five which offers some additional practical recommendations to assist the Nigerian government build a strong and long-term commitment crucial to implementing the ambitious policies that can lead to the diversification of renewable energy resources and the development of the renewable energy and energy-efficient technologies which promote energy security and climate change mitigation objectives.

CHAPTER FIVE: SUMMARY, RECOMMENDATIONS AND CONCLUSION

5.1. SUMMARY

As discussed throughout this thesis, Nigeria has been plagued with an inability to provide affordable, adequate and reliable energy despite it being endowed with ample energy resources. The reasons for this are myriad and include but are not limited to: financial challenges, lack of political will, challenges in the implementation of the Nigerian energy policies, lack of a flexible energy system, overcentralized energy system and infrastructure.¹

One of the most significant and unrealized opportunities to address the inability of Nigeria to balance energy supply and demand and achieve uninterrupted energy supply is a shift away from ongoing adherence to homogenous energy generation methods which exacerbates energy insecurity. It is the author's view and indeed the Nigerian government's view that diversification in the energy sector is the solution for resilience. Diversification however has not been forthcoming for Nigeria and thus it continues to experience significant energy disruption; relying on energy imports to meet its needs notwithstanding its domestic resource potential.

Accordingly, this thesis argues that global climate-smart trends and obligations provide Nigeria with the much needed incentive to finally shift from its current homogenous energy generation methods - methods that lead to the emission of greenhouse gases. The diversification of energy generation methods prompted by climate change obligations also responds to Nigeria's chronic energy sector problems. Thus the aim of this thesis is to demonstrate how leveraging climate change risk regulation can provoke the desired shift in the Nigerian energy sector and ultimately identifies *energy security* as the principal means through which energy sector objectives can be best promoted in Nigeria.

“Energy security” regards the generation and use of energy as a prerequisite for virtually all economic activity, and in the case of Nigeria, it is essential to be able to access sufficient amounts of energy at acceptable cost which gives rise to the notion of ‘economic aspects of energy security’ because of the centrality of present and future economic growth and

¹ See Chapter 2 of this thesis for further/detailed discussions of these issues/challenges.

development. Given that certain forms of energy exploitation and supply can have negative impacts on the environment which in turn can operate as a threat to energy security in the future, “energy security” should also emphasize the production and use of energy in an environmentally friendly or nature-friendly manner by using energy resources that inflicts reduced, minimal, or no harm upon ecosystems or the environment. Therefore a definition of energy security should explicitly balance climate change mitigation interests with economic interests. Accordingly, integration of the ‘climate change/environmental aspects of energy security’ with the ‘economic aspects of energy security’ can create a *win-win* situation for Nigeria with ‘clean energy security/production/supply’ as a veritable vehicle for achieving Nigerian climate change and economic goals and objectives.

Keeping in mind some of the limitations raised by the critical concept of “legal transplantation” (discussed in Chapter 4 of this thesis), the author sought to gain further insights for evolving the definitional and policy framework of energy security in Nigeria through examination of recent and bold initiatives taken by Germany. Germany has not only expressly considered the interface between energy security and climate change it also has taken the further step of implementing policies to diversify its energy sector. From this review, the following observations were made:

- the successful transition to diverse renewable energy supply could be supported through the development of a more flexible energy system with decentralized supply and demand;
- decentralized supply and demand is already a phenomena occurring in Nigeria;
- the use of individual model projects across Nigeria could assist in advancing a decentralized approach;
- any initiatives would have to be financially supported;
- during the transition to increased diversification through development of renewable energy supplies, a transition fuel such as natural gas would be required;
- given its particular abundance in renewable resources and its international commitment to climate change mitigation, Nigeria has the potential to concurrently influence regional and international climate negotiations;
- the promotion of standards and energy efficiency generally can assist in achieving energy security.

Taking all the foregoing into consideration, the author proposes the following integrated definition of energy security for Nigeria:

Energy Security: the production of adequate energy mix from sufficient energy reserves and resources with renewables' exploration and utilization as its core:

- made constantly available, accessible and affordable;
- channeled through reliable energy distribution systems that promote energy efficiency, green energy technology, production of electricity through flexible energy systems and the investment in decentralized energy infrastructure for effective supply and demand;
- recognizing equal treatment of climate and energy issues before the law and the need to further economic growth without compromising energy sector or climate change objectives; and
- with a view to considering Nigeria's clean energy transition as a national security project defined by climate protection and energy security objectives.

Further, promotion of energy security and climate change objectives should engender defined coordination and cooperation among the various levels of government in Nigeria by allowing the evolution of a decentralized energy infrastructure which also means reconsideration of the traditional energy producer and consumer model to allow citizens, cooperatives and local councils in Nigeria to produce and consume energy simultaneously.

While an integrated definition of energy security for Nigeria is necessary for reasons previously discussed, practically speaking there is no one-size-fits-all approach to regulatory reform in resource-led economies like Nigeria, given the diversity of political structures, institutional capacities and population characteristics among countries.² As such, it is still necessary to consider what reforms or recommendations might be the most appropriate as a starting point for the implementation and transition to a diversified renewables energy sector.

5.2. RECOMMENDATIONS

5.2.A. Preliminary Policy Framework to Promote the Dual Objectives of Energy Security and Climate Change Responses.

The energy problems as identified in the course of this discourse are basically with regards to the climate change and energy security concerns both of which are meant to work hand in hand in bringing about the expected result of improved clean energy generation and supply under an

² John P Williams, "Global Trends and Tribulations in Mining Regulation" (2012) 30 J Energy & Nat Resources L 391 at 422 [Williams].

integrated policy framework similar to Germany's model.³ If clean energy must be available, accessible, and affordable to every Nigerian then, massive renewable energy infrastructure construction and upgrade is required.⁴

The Nigerian domestic energy market is still largely underdeveloped with demand being constrained by inadequate energy supply infrastructure.⁵ In fact, it is argued that implementation of the National Energy Policy did not address the real issues of infrastructural deficit or the inability of the energy industry to generate clean energy for household and industrial consumers.⁶ It is apparent that an integrated energy security and climate change policy framework particularly goes to the root of the power chain, that is, power generation which is only a part of a larger energy generation and distribution processes.

However, all aspects of the energy generation and distribution processes require adequate infrastructure in order to ensure clean energy supply which is the ultimate goal of an integrated energy security and climate change policy framework. Just as one commentator rightly pointed out that "it is not enough to generate power, it is apt that government and the electricity companies note the fact that existing transformers and lines are highly insufficient to accommodate the required generation and transmission targets."⁷ Hence, a move towards open access and collective development of clean energy and power infrastructure would better impact on the institution of the integrated energy security and climate change policy framework and consequently enhance significant clean energy generation and supply in Nigeria.

One possible solution for overcoming the power infrastructure dilemma in Nigeria is to consider incorporating into the policy framework, opportunities to further explore and develop decentralized infrastructure.

³ Lisa Schmid, *Germany's Energy Transition: a Blueprint for European Energy Security?* (Washington, D.C.: Heinrich Böll Stiftung, 2014) III.

⁴ Energy Commission of Nigeria, *National Energy Policy (Draft Revised Edition)* (Abuja: Federal Republic of Nigeria, 2013).

⁵ Akin Iwayemi, "Nigeria's Dual Energy Problems: Policy Issues and Challenges" (2008) International Association for Energy Economics 17.

⁶ *Ibid.*

⁷ Christie Doyin, "The Challenges Facing Electricity Market in Nigeria" The National Pilot (3 April 2014), online: The NationalPilot<[www.thenationalpilot.com/03%2004%202014/The%20challenges%20facing%20electricity%20mark](http://www.thenationalpilot.com/03%2004%202014/The%20challenges%20facing%20electricity%20market%20in%20Nigeria.html)
[et%20in %20Nigeria.html](http://www.thenationalpilot.com/03%2004%202014/The%20challenges%20facing%20electricity%20mark)> (accessed 10 February 2016).

5.2.B. Investment in Renewable Energy and Incentives

Having mentioned the need to design a policy framework for the development of an integrated approach to energy security and climate change in Nigeria, it is obvious that significant financial investment is required to meet such development and facilitate its successful implementation. Evidently, investors and investments in renewable energy will only be attracted to the energy sector in Nigeria if the investment climate is stable and favorable enough to guarantee returns on investment and reasonable profit. This perception is justifiable because renewable energy development is capital intensive and potential investors will require certainty of their returns.⁸

Significant fiscal investment in renewables are needed across the energy generation and distribution value chains in order to increase Nigeria's relatively low power generation per capita.⁹ As such, incentive for investment in renewable energy infrastructure is essential to attract investors. Also, investors require some form of regulatory certainty, stability and assurance that their investment will be rewarding. Therefore, it is vital that energy tariffs for example, are set right with a view to guaranteeing investments.¹⁰

Further, the Federal Government of Nigeria (FGN) is encouraged to create the suitable political, planning and regulatory systems for investment in thermal, solar, and wind energy generation capacities.¹¹ The FGN is also persuaded to integrate private investment in the renewable energy development with that of public investment in the energy sector if it wants to achieve its energy security and climate change objectives.¹² This integration of private and public investments is necessary because a high level of investment, regulatory and organizational cooperation is required between both the renewable and non-renewable energy sectors to achieve visible transformation of the Nigerian energy industry. This is important because foreign and local

⁸ JFK Akinbami, "Renewable Energy Resources and Technologies in Nigeria: Present situation, Future Prospects and Policy Framework" (2001) 6 Mitigation and Adaptation Strategies for Global Change 155-181.

⁹ *Ibid.*

¹⁰ Eyo O Ekpo, "Electricity Tariffs: Low or High, Right or Wrong?" Elecoblogs online: <www.eyoekpo.com/page/3> [Ekpo].

¹¹ JFK Akinbami, *supra* note 8.

¹² LO Adekoya and AA Adewale, "Wind Energy Potential of Nigeria" (1992) 2:1 Renewable Energy 35-39.

investments will be stimulated by greater transparency and a level playing ground established by the government.¹³

Therefore, concerns relating to availability and accessibility of incentives need to be addressed as they can assist in jumpstarting the integrated approach to energy security and climate change. It is thus recommended that existing regulatory incentives (especially fiscal incentives) for production and utilization of oil and gas be extended to renewable energy development.¹⁴

It is also important to note that, transitioning to a low-carbon energy future will require massive investments in the development and widespread deployment of new technologies and their associated infrastructure, a feat that likely will involve new partnerships across various financial sectors in many countries, including Nigeria.¹⁵

5.2.C. Encouragement of Private Sector Participation

Recently, the FGN policies have been encouraging private sector involvement in the energy industry. However, there is still need for more private sector participation in the renewable energy production, transportation, supply, power generation and power distribution systems with a view to enhancing competition and optimal productivity. Therefore, it is recommended that the development of renewable energy infrastructure be private-sector driven and government participation should be limited to creating appropriate legislation and policies to enable the mobilization of private capital and investment. The use of model projects may be implicated here.

5.2.D. Appropriate Management and Regulation

Proper management and regulation of energy supply and implementation of the integrated energy security and climate change policy framework is necessary to support the appropriate infrastructure in order to make the energy industry operate effectively and efficiently.¹⁶ There is

¹³ *Ibid.*

¹⁴ Muhammed Tawfiq Ladan, "Policy, Legislative and Regulatory Challenges in Promoting Efficient and Renewable Energy for Sustainable Development and Climate Change Mitigation in Nigeria" (Paper delivered at the 3rd Symposium and 2nd Scientific Conference of ASSELLAU, University of Nairobi, Kenya, 23-25 March 2009) 15.

¹⁵ Ann Florini, "The Peculiar Politics of Energy" (2012) 26:3 Ethics and International Affairs 293-309.

¹⁶ JY Oricha and GA Olarinoeye, "Analysis of Interrelated Factors affecting Efficiency and Stability of Power Supply in Nigeria" (2012) 2:1 International Journal of Energy Engineering 1-8.

particularly a need for steady strategies and regulatory mechanisms to control and synchronize some peculiar overlapping activities especially in the renewable and non-renewable energy sectors where necessary.¹⁷ There have been several attempts at improving the regulatory framework for the renewable energy sector, for example, the creation of the Renewable Energy Master Plan of 2005 (REMP),¹⁸ but these attempts and efforts have at best been inconclusive or inoperative and it is recommended that policies and regulations be broadly discussed, stabilized and consistently implemented by the government and other appropriate agencies.¹⁹

The government needs to develop good policy and a framework of legal and regulatory mechanisms that would foster the development of renewable energies, attract investors—foreign and domestic—and also, as observed in Germany, to set standards for development of renewable energy technologies. Potential investors wait to see the level of seriousness demonstrated by the government and what opportunities will be put in place to enhance marketability of renewable energy technologies within Nigeria before investing their money.²⁰ Such seriousness should be demonstrated in policy documents and their implementation. The need to have a determinable pricing framework for all renewable energies generated is also an important issue that should be regulated and monitored.

5.2.E. Promotion of Energy Efficiency and Energy Conservation

Energy efficiency has been defined as essentially using less energy to provide the same service.²¹ Investment into energy efficiency can provide additional economic value by preserving the resource base (specifically combined with pollution prevention technologies) and mitigating climate change.²² Promotion of energy efficiency has numerous advantages, such as the efficient exploitation of natural resources, the reduction in air pollution levels, and reduced spending by

¹⁷ *Ibid.*

¹⁸ Nigeria's Renewable Energy Master Plan of 2005 (ECN-UNDP) says that the country should endeavour to increase the energy generation capacity from 5000 MW to 16000 MW by 2015 through the exploration of renewable energy resources.

¹⁹ Charles Adebayo, "How is 100% renewable energy possible for Nigeria?" (2014) Global Energy Network Institute (GENI) 16 online: <<http://geni.org/globalenergy/research/renewable-energy-potential-of-nigeria/100-percent-renewable-energy-Nigeria.pdf>> (accessed 28 November 2015).

²⁰ *Ibid.*

²¹ MA Rosen "Energy Sustainability: A Pragmatic Approach and illustrations" (2009) 1 Sustainability 55–80.

²² SO Oyedepo, "Energy and sustainable development in Nigeria: the way forward" (2012) 2:1 Energy, Sustainability and Society 12.

the consumers on energy-related expenditure.²³ Substantial investment in energy-efficient technologies lead to long-term benefits, including reduced energy consumption, local environmental enhancement, and general economic development.²⁴ Cost-effective energy efficiency is the ultimate strategy for multiple pollutant reduction.²⁵ A lot of energy is wasted in Nigeria because households, public and private offices, as well as industries use more energy than is actually necessary to fulfill their needs. This situation is exacerbated through the use of outdated and inefficient equipment and production processes by households and industries in Nigeria.²⁶

As demonstrated by Germany, measures taken to minimize energy consumption, or to use the energy more effectively, are additional for tackling climate change. Energy efficiency and energy conservation are separate but related concepts. Energy efficiency is achieved when energy intensity in a specific product, process, or area of production or consumption is reduced without affecting output, consumption, or comfort levels.²⁷ Promotion of energy efficiency will contribute to energy conservation and is therefore an essential element of energy conservation promotional policies.²⁸ Energy efficiency²⁹ embraces conserving a scarce resource; improving the technical efficiency of energy conversion, generation, transmission and end-use devices; substituting more expensive fuels with cheaper ones; and reducing or reversing the negative impact of energy production and consumption activities on the climate system.

In Nigeria, energy conservation presents a pragmatic means of achieving four implicit objectives that should be of high priority if Nigeria intends to adopt an integrated approach to energy security and climate change mitigation. These objectives are economic competitiveness, utilization of scarce capital for development, environmental quality, and sustainable energy.³⁰ Energy conservation techniques protect the environment in the short run by reducing pollution

²³ *Ibid.*

²⁴ *Ibid.*

²⁵ SB Adeyemo and AO Odukwe, "Energy Conservation as a Viable Pathway towards Energy Stability" (2008) 3:3 *Journal of Engineering and Applied Sciences* 233–238.

²⁶ SO Oyedepo, *supra* note 22 at 12.

²⁷ *Ibid* at 13.

²⁸ *Ibid.*

²⁹ Adeola Adenikinju, "Efficiency of the Energy Sector and its Impact on the Competitiveness of the Nigerian Economy" (2008) *International Association for Energy Economics* 27.

³⁰ SO Oyedepo, *supra* note 22 at 13.

and in the long run by mitigating global climate change.³¹ It promotes energy security through a reduced demand and a reduced dependence on fossil fuels. No energy supply option may be able to provide all these benefits. Energy conservation is a decentralized issue and it offers an individualized approach to addressing energy security and climate change concerns in Nigeria because it is dependent upon the actions of different people in diverse fields who consciously and independently act to save energy.³²

5.3. CONCLUSION

The end result this evaluation seeks to achieve is a significant contribution to the conversation geared towards the overall effectiveness of the Nigerian energy security and climate change policies. This effectiveness in simple terms is basically the realization of constant and sufficient clean energy supply in the Nigerian state for businesses, households and other electric power consumers which will ultimately boost the economy and improve the environment.

Taking a cue from the provisions of the Revised National Energy Policy, 2013, diversification and development of renewable energy sources are necessary to establish the framework for sustainable energy development in Nigeria with the overall objective of providing clean, affordable, adequate and reliable energy based on the active participation of the private sector. A coherent and comprehensive energy policy is essential in guiding a country towards effective utilization of its energy resources.³³ The development of an integrated definition of energy security along with a legal framework established on the principles of *resilience* and *climate-energy sovereignty* - is a step toward achieving such a policy.

³¹ *Ibid.*

³² *Ibid.*

³³ Energy Commission of Nigeria, *supra* note 4.

CHAPTER 6: ADDENDUM

In December 2015, the governments of 190 states gathered in Paris to deliberate on a feasible new and binding international pact/accord on climate change, aimed at tackling global greenhouse gas emissions and therefore averting the risks and threats posed by climate change.¹ Governments negotiated in Paris with the goal of creating a new binding global accord on climate change that would last till 2030 and beyond because the existing commitments on greenhouse gas emissions would run out in 2020.² Accordingly, 195 states negotiated and adopted the first-ever international and legally-binding climate agreement at the Paris Climate Conference (COP 21) in December 2015.³ The agreement which is due to enter into force in 2020 sets out an international action plan to put the world on the pathway to avoid risky and threatening climate change by checking/fighting global warming to well below 2°C.⁴ The Paris Agreement bridges the gap between today's policies and climate-neutrality before the end of 2020.⁵

Mitigation (reducing emissions) is a principal element and governments agreed on a long-term objective of keeping the increase in global average temperature to well below 2°C above pre-industrial levels with the plan to limit the increase to 1.5°C and thus significantly reduce risks and the impacts of climate change.⁶ In order to reduce emissions, governments also agreed on the need for global emissions to peak as soon as possible and recognized that it would take longer for developing countries and therefore decided to undertake rapid reductions thereafter in accordance with the best available science.⁷ It is important to note that before and during the Paris conference, countries submitted comprehensive national climate action plans (INDCs). These are not yet enough to keep global warming below 2°C, but the agreement traces the way to achieving this target.⁸

The agreement places a legal obligation on developed countries to continue to provide climate finance to developing countries which is another key element of the Paris climate deal.⁹ It further encourages other countries to provide support voluntarily — a compromise between the highly

¹ Fiona Harvey, "Everything you need to know about the Paris climate summit and UN talks" The Guardian (2 June 2015) online: <<http://www.theguardian.com/environment/2015/jun/02/everything-you-need-to-know-about-the-paris-climate-summit-and-un-talks>> (accessed 30 January 2016).

² *Ibid.*

³ European Commission "Paris Agreement" online:

<http://ec.europa.eu/clima/policies/international/negotiations/future/index_en.htm> (accessed 27 March 2016).

⁴ *Ibid.*

⁵ *Ibid.*

⁶ *Ibid.*

⁷ *Ibid.*

⁸ *Ibid.*

⁹ Carbon Brief CLEAR ON CLIMATE, "Analysis: The final Paris climate deal" Climate Brief Limited online: <<http://www.carbonbrief.org/analysis-the-final-paris-climate-deal>> (accessed 30 January 2016).

polarized positions that have taken centre stage at the Paris negotiations.¹⁰ In order to ensure transparency and global ‘stocktaking’, governments agreed to come together every 5 years to set more ambitious targets as required by science and report to each other and the public on how well they are doing to implement their targets with a view to tracking progress towards the long-term goal through a robust transparency and accountability system.¹¹

The Paris climate deal (COP 21 pact) has been seen by many observers as giving a new impetus to African countries towards combatting climate change. The Paris Accord, ratified by nearly 200 countries, arguably has pertinent policy and development implications for the people of Africa and other developing countries that greatly rely on agriculture for a living.¹² As mentioned early in this thesis, Africa has been the hardest hit by the impacts of climate change. Climate change has significantly affected African economies through relentless droughts, floods, and storms which, in turn, have adversely impacted food security¹³ and energy security. It has been observed that the Paris climate pact places Nigeria and the whole of Africa in a favorable position with regard to the use of renewable energy to meet their energy needs and tackle the energy emergencies posed by dangerous climate change.¹⁴

Further, Channing Arndt, a senior fellow at the United Nations University recognized the rich natural endowments of African countries. Arndt noted that “Africa has very good reasons to avoid extreme warming scenarios... The continent also possesses abundant sun, wind and hydropower resources as well as substantial, and growing, reserves of natural gas, which is a relatively clean fossil fuel.”¹⁵ Arndt concluded that the enormity of “Africa’s renewable energy endowments place the continent in a favourable position.”¹⁶ Therefore, if the spirit and letter of the Paris Agreement are strictly followed and implemented, African countries have “the potential to exploit a comparative advantage in energy production.”¹⁷ There is an urgent need to begin restructuring and modernizing the Nigerian energy industry and it is this author’s hope and expectation that Nigerian leaders and policymakers will take advantage of the opportunities presented by the Paris Climate Agreement to diversify the Nigerian energy industry by reducing the reliance on crude oil and promoting renewable energy production with a view to stimulating the transitioning to a clean energy future that is becoming fashionable and attractive globally.

¹⁰ *Ibid.*

¹¹ European Commission, *supra* note 3.

¹² Shepherd Mutsvara, “United Nations COP21 and the Implications for Africa” Liberty Voice (23 December 2015) online: <<http://guardianlv.com/2015/12/united-nations-cop21-and-the-implications-for-africa/>> (accessed 30 January 2016).

¹³ *Ibid.*

¹⁴ Megan Rowling, “Can UN climate talks catch up with the real world?” Mail Online Wire/ Reuters (4 November 2015) online: <<http://www.dailymail.co.uk/wires/reuters/article-3303201/Can-UN-climate-talks-catch-real-world.html>> (accessed 30 January 2016).

¹⁵ Channing Arndt, “Changes since Copenhagen means Paris will deliver more for developing countries” The Conversation (December 6 2015) online: <<http://theconversation.com/changes-since-copenhagen-means-paris-will-deliver-more-for-developing-countries-51493>> (accessed 30 January 2016).

¹⁶ *Ibid.*

¹⁷ *Ibid.*

Finally, implementation of the Paris Agreement should help to move the promotion of energy security and climate change objectives forward in Nigeria by engendering defined coordination and cooperation among the various levels of government in Nigeria.

BIBLIOGRAPHY

PRIMARY SOURCES

Bali Conference, UN Doc FCCC/CP/2007/6/Add.1, Mar. 14 2008.

Biofuel Quota Act, BioKraftQuG 2007.

Cancun Agreements, UN Doc FCCC/CP/2010/7/Add.1, Mar. 15 2011.

Carbon Capture and Storage Act, KSpG 2012.

Constitution of the Federal Republic of Nigeria, 1999, Cap C24, Laws of the Federation of Nigeria (LFN) 1990.

Copenhagen Accord, UN Doc FCCC/CP/2009/L.7, Dec. 18 2009.

Climate Change Commission Bill, 2011, [HB. 30] No. C 531-C 540 (Climate Change Commission Bill).

Combined Heat and Power Act, KWKG 2002.

Durban Agreements, UN Doc FCCC/CP/2011/L. 10, Dec. 10 2011.

Doha Climate Gateway, UN Doc FCCC/CP/2012/L. 13, Dec. 7 2012.

Draft Energy Policy Guideline, 1984.

Energy and Climate Fund Act, EKFG 2010.

Energy Consumption Labelling Act, EnVKG 1997.

Energy Industry Act, EnWG 2005.

Energy Saving Act, EnEG 1976.

Federal Environmental Protection Act, LFN 2004, Cap F 10, s.4, as repealed by National Environmental Standards Regulations and Enforcement Agency (Establishment) Act (July 2007) Act No. 25 94/92 Official Gazette of the Federal Republic of Nigeria 31.

Grid Expansion Acceleration Act, NABEG 2011.

Lima Accord for Climate Action, UN Doc FCCC/CP/2014/L. 14, Dec. 13 2014.

National Energy Policy, 2003.

National Energy Policy (Draft Revised Edition), 2013.

National Policy on the Environment, 1989.

Nigerian Gas Master Plan, 2008.

Nigerian Renewable Energy Master Plan, 2011.

Oil Pipelines Act, 1956, Cap 338, Laws of the Federation of Nigeria (LFN) 1990.

Petroleum Act, 1969, Cap P350, Laws of the Federation of Nigeria (LFN) 1990.

Petroleum (Drilling and Production) Regulations, 1969.

Power Grid Expansion Act, EnLAG 2009.

Renewable Energy Sources Act, Act on the Development of Renewable Energy Sources
(Renewable Energy Sources Act - RES Act 2014).

The National Environmental Standards and Regulations Enforcement Agency (Establishment) Act, 2007 [NESREA Act].

The Kyoto Protocol, UN Doc FCCC/CP/1997/7/Add.1, Dec. 10, 1997; 37 ILM 22 (1998) (entered into force 16 February 2005).

United Nations Framework Convention on Climate Change, 9 May 1992, 1771 UNTS 107, art 1, 31 ILM 849 (entered into force 21 March 1994) [UNFCCC].

SECONDARY SOURCES

BOOKS

AA Awwad and AA Mohammed, "World Energy Road Map-A Perspective" in *Energy Future in an Interdependent World* (London: World Energy Council, 2007).

Alan Watson, *Legal Transplants: An Approach to Comparative Law* (Edinburgh: Scottish Academic Press 1974).

Alan Watson, *The Evolution of Western Private Law* (Baltimore: Johns Hopkins University Press, 2001).

Amulya K.N. Reddy et al., "Energy and Social Issues" in *World Energy Assessment: Energy and the Challenge of Sustainability* (New York: United Nations Development Programme Bureau for Development Policy, 2000).

Anthony Giddens, *Politics of Climate Change* (Cambridge: Polity, 2009).

Atle Midttun and Nina Witoszek, *Energy and Transport in Green Transition: Perspectives on Ecomodernity Routledge Studies in Sustainability* (New York: Routledge, 2015).

Caroline Kuzemko, *The Energy Security-Climate Nexus: Institutional Change in the UK and Beyond* (London: Palgrave Macmillan, 2013).

Caroline Kuzemko, Michael F Keating & Andreas Goldthau, *The Global Energy Challenge: Environment, Development and Security* (London: Palgrave Macmillan, 2015).

CB Field et al., *Climate Change 2014: Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, England: Cambridge University Press, 2014).

Center for Naval Analyses, *National Security and the Threat of Climate Change* (Washington DC: CNA Corporation, 2007).

Daniel Yergin, *The Quest: Energy, Security, and the Remaking of the Modern World* (New York: Penguin Press, 2011).

Daniel R. Lynch, *Sustainable Natural Resource Management for Scientists and Engineers* (New York: Cambridge University Press, 2009).

David Freestone, "The International Climate Change Legal and Institutional Framework: An Overview" in David Freestone and Charlotte Streck, eds, *Legal Aspects of Carbon Trading: Kyoto, Copenhagen, and beyond* (Oxford: Oxford University Press, 2009).

Douglas R Bohi, Michael A Toman and Margaret A Walls, *The Economics of Energy Security* (Boston: Kluwer Academic Publishers, 1996).

Erkki Hollo, Kati Kulovesi, Michael Mehling, *Climate Change and the Law* (Berlin: Springer Science & Business Media, 2012) 149.

Evaristus Oshionebo, *Regulating Transnational Corporations in Domestic and International Regimes An African Case Study* (Toronto: University of Toronto Press Incorporated, 2009).

G Bruce Doern and Burkard Eberlein, *Governing the Energy Challenge: Canada and Germany in a Multi-level Regional and Global Context* (Toronto: University of Toronto Press, 2009).

George Walter Hoffman and Leslie Dienes, *The European Energy Challenge: East and West* (Durham: Duke University Press, 1985).

Henryk Faas et al., "European Security – A European Perspective" in A Gheorghe and L Muresan, eds., *Energy Security: International and Local Issues* (Netherlands: Springer, 2011).

Liz Bossley, *Climate Change and Emissions Trading: What Every Business Needs to Know*, 2d ed. (London: Consilience Energy Advisory Group Limited, 2005).

John Deutch, Anne Lauvergon & Widhyawan Prawiraatmadja, *Energy Security and Climate Change* (Washington, Paris, Tokyo: The Trilateral Commission, 2007).

Meinhard Doelle, *From Hot Air To Action? Climate Change, Compliance and the Future of International Environmental Law* (Toronto: Thomson Carswell Limited, 2005).

Michael Toman, "The Economics of Energy Security" in AV Kneese and JL Sweeney, eds., *Handbook of Natural Resource and Energy Economics* (Amsterdam: Elsevier B.V./North Holland, 1993).

Matthew H Brown, Christie Rewey & Troy Gagliano, *Energy Security* (Washington, DC: National Conference of State Legislatures, 2003).

Sharon Burke and Christine Parthemore, *A Strategy for American Power: Energy, Climate and National Security* (Washington, DC: Center for a New American Security, 2008).

M Grubb, C Vrolijk & D Brack, *The Kyoto Protocol: A Guide and Assessment* (London: Royal Institute of International Affairs and Earthscan Publications, 1999) (London: Earth Scan, 1999).

ML Parry et al., eds., *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, UK: Cambridge University Press, 2007).

MT Ladan, "Law, Cases and Policies on Energy, Mineral Resources, Climate Change, Environment, Water, Maritime, and Human Rights in Nigeria" (Zaria: Ahmadu Bello University Press, 2009).

Nicholas Herbert Stern, *The Economics of Climate Change: The Stern Review* (Cambridge: Cambridge University Press, 2007).

Dimitri Aperjis, *The Oil Market in the 1980s: OPEC Oil Policy and Economic Development* (Cambridge, Mass.: Ballinger Pub., 1982);

Naomi Oreske & EM Conway, *The Collapse of Western Civilization: A View from the Future* (New York: Columbia University Press, 2004).

Nicholas Stern, *A Blueprint for a Safer Planet: How to Manage Climate Change and Create a New Era of Progress and Prosperity* (London: Bodley Head Vintage Publishing, 2009).

Nicolas Lefèvre, *Energy Security and Climate Policy: Assessing Interactions* (Paris: International Energy Agency, 2007)

Peter M. Haas, Robert O. Keohane & Marc Levy, *Institutions for the Earth: Sources of Effective International Environmental Protection* (Cambridge: MIT Press, 1993).

P Ramchandra and D Boucar, *Solar Lighting (Green Energy and Technology)* (London: Springer Publishing Company, 2011).

PH Jean and DF Marc, "From a forced dependency to positive cooperation in the field of energy" in *Energy Future in an Interdependent World* (London: World Energy Council, 2007).

P.V.S.N and B.S. Adebuseyi, "Nigeria's Power Sector: Opportunities and Challenges", in P. Collier, C. Pattillo and C.C. Soludo, eds., *Economic Policy Options for a Prosperous Nigeria* (New York: Palgrave Macmillan, 2008) 301 - 327.

Gordon Sullivan et al, *National Security and the Threat of Climate Change*, Centre for Naval Analyses (Virginia: Centre for Naval Analyses, 2007).

P Ekins, M Winskel and J Skea, "Putting it all Together: Implications for Policy and Action" in P Ekins, M Winskel and J Skea, eds., *Energy 2050: Making the Transition to a Secure Low Carbon Energy System* (London: Earthscan, 2011).

PO Itsueli, "Environmental Pollution in Nigeria: An Appraisal of Corporate Social Responsibility for Victims of Oil Pollution in Nigeria" in Festus Emiri and Gowon Deinduomo, eds., *Law and Petroleum Industry in Nigeria: Current Challenges* (Lagos: Malthouse Press Ltd, 2009) 108.

R Huebert et al, *Climate Change and International Security: The Arctic as a Bellwether* (Arlington, Virginia: Center for Climate and Energy Solutions, 2012).

RK Pachauri et al., *Climate Change 2014: Synthesis Report: A Contribution of Working Groups I, II, III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, England: Cambridge University Press, 2014).

Sander Simonetti and Rutger de Witt Wijnen, "International Emissions Trading and Green Investment Schemes" in David Freestone and Charlotte Streck, eds, *Legal Aspects of Carbon Trading: Kyoto, Copenhagen, and beyond* (Oxford: Oxford University Press, 2009).

Simon Warikiyei Amaduobogha, "Environmental Regulation of Foreign Direct Investment in the Oil and Gas Sector" in Festus Emiri and Gowon Deinduomo, eds., *Law and Petroleum Industry in Nigeria: Current Challenges* (Lagos: Malthouse Press Ltd, 2009)

TF Stocker eds., *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, England: Cambridge University Press, 2013).

Walter Leal Filho and Vlasios Voudouris, eds., *Global Energy Policy and Security* (England: Springer London Ltd, 2013).

DISSERTATIONS

Janet Oluwadunni Shodipo, "Gas to Power: Enhancing and Optimizing the Domestic Gas Supply Obligation for Improved Power Generation and Supply in Nigeria" (Master of Laws, University of Manitoba, 2015) [Unpublished].

OA Jesuleye, "Analysis and Policy Implications of Energy Demand in the Nigerian Petroleum Refining Industry" (MSC Thesis, Obafemi Awolowo University, 1999) [Unpublished].

JOURNAL ARTICLES

A Ellerman, Denny Buchner & K Barbara, "The European Union Emissions Trading Scheme: Origins, Allocation, and Early Results" (2007) 1:1 Rev of Environmental Economics and Pol'y 66-87.

Abbott et al., "The Concept of Legalization" (2000) 54:3 International Organization 401-419.

Adeola Adenikinju, "Efficiency of the Energy Sector and Its Impacts on the Competitiveness of the Nigerian Economy" (2008) International Association for Energy Economics 27-29.

Adegbemi Babatunde Onakoya et al., "Energy Consumption and Nigerian Economic Growth: An Empirical Analysis" (2013) 9:4 European Scientific Journal 25 – 40.

Alan Watson, "The Birth of Legal Transplants" (2012-2013) 41 Ga J Int'l & Comp L 605 at 607.

A. Loeschel et al., "Energy security-concepts and indicators" (2010) 38 Energy Policy 1607-1608.

Akin Iwayemi, "Nigeria's Dual Energy Problems: Policy Issues and Challenges" (2008) International Association for Energy Economics 17.

Aminu Hassan, "Gas Flaring in Nigeria: Analysis of Changes in its consequent carbon emission and reporting" (2013) 37:2 Accounting Forum.

Ikeme, J. "Nigeria's electric power sector reform: what should form the key objectives?" (20015) 33 Energy Policy 1213-1221.

Andreas Bjurstrom and Merritt Polk, "Climate Change and Interdisciplinarity: a Co-citation Analysis of IPCC Third Assessment Report" (2011) 87:3 Scientometrics 525.

Anita M Halvorssen, "UNFCCC, The Kyoto Protocol, and the WTO-Brewing Conflict or are they mutually Supportive" (2007-2008) 36 Denv. J. Int'l L. & Pol'y 369.

Ann Ogbo, Ndubuisi Laurretta & Wilfred Ukpere, "Risk Management and Challenges of Climate Change in Nigeria" (2013) 41:3 Journal of Human Ecology 221-235.

AS Sambo, "Strategic developments in renewable energy in Nigeria" (2009) 4 International Association of Energy Economics 15-19.

BC Staley et al., "Evaluating the Energy Security Implications of a Carbon-Constrained U.S. Economy" (2009) World Resources Institute, Center for Strategic and International Studies.

Bazilian Morgan, et. al., "Interactions between Energy Security and Climate Change: A Focus on Developing Countries" (2011) 39:6 Energy Policy 3750-3756.

B Stephen, PA Huntington & G Hillard, "Energy Security and Climate Change Protection: Complementarity or tradeoff?" (2008) 36:9 Energy Policy 3510-3513.

Bert Kruyt , DP van Vuuren, HJM de Vries and H Groenenberg , "Indicators for energy security " (2009) 37 Energy Policy 2166.

B Sovacool and M Brown, "Competing Dimensions of Energy Security: An International Perspective" (2010) 35:1 Annual Review of Environment and Resources 77-108.

Carlo Fanelli, "Climate Change: The Greatest Challenge of Our Time" (2014) 25 Alternate Routes: A Journal of Critical Social Research.

Caroline Kuzemko, *The Energy Security-Climate Nexus: Institutional Change in the UK and Beyond* (London: Palmgrave Macmillan, 2013).

Cass R Sunstein, "Of Montreal and Kyoto: A Tale of Two Protocols" (2007) 31:1 Harvard Environmental Law Review 27.

C Hepburn & N Stern, "A New Global Deal on Climate Change" (2008) 24 Oxford Rev of Economic Policy 259-279.

CC Ifeanyi-Obi, UR Etuk & O Jike-wai, "Climate Change, Effects and Adaptation Strategies; Implication for Agricultural Extension System in Nigeria" (2012) 2:2 General Journal of Agricultural Sciences 053-060.

Daniel Yergin, "Ensuring Energy Security" (2006) 85:2 Foreign Affairs 69

Davidson et al, "The Development and Climate Nexus: The Case of Sub-Saharan Africa" (2003) 3:1 Climate Policy 97-113.

Donald Feaver and Nicola Durrant, "A Regulatory Analysis of International Climate Change Regulation" (2008) 30:4 Law and Policy 394-422.

David Toke & Sevasti-Eleni Vezirgiannidou, "The Relationship between Climate Change and Energy Security" (2013) 22:4 Environmental Politics.

ECN Okafor and CKA Joe-Uzuegbu, "Challenges to Development of Renewable Energy for Electric Power Sector in Nigeria" (2010) 2:2 International Journal of Academic Research 211-216.

E Gnansounou, "Assessing the energy vulnerability: case of industrialized countries" (2008) 36:10 Energy Policy 3734-3744.

Eleftheria Vasileiadou, Gaston Heimeriks & Arthur Peterson, "Exploring the Impact of the IPCC Assessment Reports on Science" (2011) 14:8 Environmental Science and Policy 1052.

Elizabeth Burleson, "The Bali Climate Change Conference" (2008) 12:4 American Society of International Law.

Emil Kirchner and Berk Can, "European Energy Security Co-operation: Between Amity and Enmity" (2010) 48:4 Journal of Common Market Studies 859-880.

FI Ibitoye, "Strategies for implementation of CO₂-mitigation options in Nigeria's energy sector" (1999) 63 Applied Energy 1-16.

Gawdat Baghat, "Europe's Energy Security: Challenges and Opportunities" (2006) 82:5 International Affairs 961-975.

Gozie Ogbodo, "Environmental Protection in Nigeria: Two Decades after the Koko Incident" (2009) Annual Survey of International and Comparative Law.

H Gujba, Y Mulugetta & A Azapagic, "Environmental and Economic Appraisal of Power Generation Capacity Expansion Plan in Nigeria" (2010) 38 Energy Policy 5636-5652.

Henryk Faas et al., *supra* note 7 at 9; AF Alhaji, "What Is Energy Security? Definitions and Concepts" (2008) 6:3 OGEL.

Ikeme, J. "Nigeria's electric power sector reform: what should form the key objectives?" (20015) 33 Energy Policy 1213-1221.

IseOlorunkanmi O Joseph, "Issues and Challenges in the Privatized Power Sector in Nigeria" (2014) 6:1 Journal of Sustainable Development Studies 161-174.

Jacob Wertsman, "The Clean Development Mechanism; Unwrapping the 'Kyoto Surprise'" (1998) 7 Rev. Eur. Community & Int'l Env'tl. L. 147.

JFK Akinbami, et al., "Biogas Energy Use in Nigeria: Current Status, Future Prospects and Policy Implications" (2001) 5 Renewable and Sustainable Energy Review 97-112.

JFK Akinbami, "Renewable Energy Resources and Technologies in Nigeria: Present situation, Future Prospects and Policy Framework" (2001) 6 Mitigation and Adaptation Strategies for Global Change 155-181.

Jin-Young Moon and Sung Hee Lee, "Warsaw COP 19 Outcomes and Implications of Climate Finance" (2014) Korean Institute for International Economic Policy.

Jon Barnett & Neil W Adger, "Climate Change, Human Security, and Violent Conflict", Political Geography 26.

JY Oricha and GA Olarinoye, "Analysis of Interrelated Factors affecting Efficiency and Stability of Power Supply in Nigeria" (2012) 2:1 International Journal of Energy Engineering 1-8.

Kenneth W. Abbott and Duncan Snidal, "Hard and Soft Law in International Governance" (2000) 54:3 International Organization 421-456.

KI Idigbe and SO Onohaebi, "Repositioning the Power Industry in Nigeria to Guarantee Reliability in Operation and Services" (2009) 4:2 Journal of Engineering and Applied Sciences 119-125.

K Uduma and T Arciszewski, "Sustainable Energy Development: The Key to a Stable Nigeria" (2010) 2 Sustainability 1558-1570.

Kaniye Ebeku, "Oil and the Niger Delta People in International Law: Resource Rights" (2006) Environmental and Equity Issues, 189.

LO Adekoya and AA Adewale, "Wind Energy Potential of Nigeria" (1992) 2:1 Renewable Energy 35-39.

Lutz Kilian, "The Economic Effects of Energy Price Shocks" (2008) 46:4 Journal of Economic Literature 871-909.

Lisa Stevens, "The Illusion of Sustainable Development: How Nigeria's Environmental Laws are Failing the Niger Delta" (2012) 36 Vermont Law Review 387.

M Asif and T Muneer , "Energy supply, its demand and security issues for developed and emerging economies" (2007) 11 Renewable and Sustainable Energy Reviews 1388.

Marcus Dubois King and Jay Gulledge, "Climate Change and Energy Security Nexus" (2013) 37:2 The Fletcher Forum of World Affairs 38.

MA Adelman, "OPEC At Thirty Years: What Have We Learned?"(1990) 15 Annual Review of Energy 1-22.

Maren I Borok, Agontu J Agandu and Mangai M Morgan, "Energy Security in Nigeria: Challenges and Way Forward" (2013) 2:11 International Journal of Engineering Science Invention 1.

M Grubb, M Butler and L Twomey, "Diversity and Security in UK Electricity Generation: the influence of low-carbon objectives" (2006) 34 Energy Policy 4050-4062.

Miranda Schreurs, "From the Bottom Up: Local and Subnational Climate Change Politics," (2008) 17 Journal of Environment and Development 343.

MT Ladan, "Review of NESREA Act 2007 and Regulations 2009 – 2011: A New Dawn in Environmental Compliance and Enforcement in Nigeria" (2012) 8 Law, Environment and Development Journal 116.

OO Famuyide, SE Anamayi & JM Usman, "Energy Resources' Pricing Policy and Its Implications on Forestry and Environmental Policy Implementation in Nigeria" (2011) 2:1 Continental Journal of Sustainable Development 7.

O Ajayi and K Ajanaku, "Nigeria's Energy Challenge and Power Development: The Way Forward" (2009) 20:3 Energy and Environment 411-413.

OA Olaniyi, ZO Ojekunle & BT Amujo, "Review of Climate Change and Its Effect on Nigerian Ecosystem" (2013) 1 International Journal of African and Asian Studies.

OF Oluduro, "Climate Change – A Global and National Perspective: The Case of Nigeria" (2012) 5:3 Journal of Politics and Law 33.

OI Okoro and E Chikuni, "Power Sector Reforms in Nigeria: Opportunities and Challenges" 18:3 Journal of Energy in Southern Africa 52-57.

Olanrewaju Fagbohun, "Implementing an Effective Regulatory Scheme for Climate Change in Nigeria: The Role of Law" (2011) 1 Nigerian Institute of Advanced Legal Studies Journal of Environmental Law 283.

Oluseyi O Ajayi and Kolawole O Ajanaku, "Nigeria's Energy Challenge and Power Development: The Way Forward" (2009) 20:3 Energy and Environment.

Opeyemi Akinyemi, Adeyemi Ogundipe & Philip Alege, "Energy Supply and Climate Change in Nigeria" (2014) 4:14 Journal of Environment and Earth Science.

Otto Kahn-Freund, "On Uses and Misuses of Comparative Law" (1974) 37 Modern Law Review 1 at 27.

PAO Odjugo, "General Overview of Climate Change Impacts in Nigeria" (2010) 29:1 Journal of Human Ecology 47-55.

PAO Odjugo, "An Analysis of Rainfall Pattern in Nigeria" (2005) 4:2 Global Journal of Environmental Science 139-145; PAO Odjugo, "The Impact of Climate Change on Water Resources; Global and Regional Analysis" (2007) 39 The Indonesian Journal of Geography 23-41.

P Chylek, et al., 1st International Conference on Global Warming and the Next Ice Age, Conference Proceedings, Halifax, Nova Scotia, Canada, 19-24 August 2001 (Halifax: Dalhousie University, 2001).

RC Okeke, EMC Izueke and FI Nzekwe, "Energy Security and Sustainable Development in Nigeria" (2014) 4:3 Arabian Journal of Business and Management Review.

Rosaline Baindu Cowan, "The Effect of Transplanting Legislation from one Jurisdiction to Another" (2013) 39:3 Commonwealth Law Bulletin 479.

Robert Mabro, "On the Security of Oil Supplies, Oil Weapons, Oil Nationalism and all that" (2008) 32:1 OPEC Energy Review 1-12.

PAO Odjugo, "The Impacts of Global Warming on Climate Change and extreme weather conditions: Global and Regional Evidences" (2007) 7 Asia Pacific Journal on Environment and Development 53-70 at 52.

Pinar Ipek, "Azerbaijan's Foreign Policy and Challenges for Energy Security" (2009) 63:2 Middle East Journal 227-239.

Rik Leemans, "Personal Experiences with the Governance of the policy-relevant IPCC and Millennium Ecosystem Assessments" (2008) 18:1 Global Environmental Change 12.

Schaeffer, et al., "Energy Sector Vulnerability to Climate Change: A Review" (2011) *Energy* 38.

SO Akande and FB Olorunfemi, "Research and Development Potentials in Biofuel Production in Nigeria" (2009) 3:3 *African Research Review* 34-45.

SO Oyedepo, "On Energy for Sustainable Development in Nigeria" (2012) *Renewable and Sustainable Energy Reviews* 2583-2598.

SO Oyedepo, "Energy in Perspective of Sustainable Development in Nigeria" (2013) 1:2 *Sustainable Energy* 14-25.

Sunday Michael Agba, "Energy Poverty and the Leadership Question in Nigeria: An overview and Implication for the Future" (2011) 3:2 *Journal of Public Administration and Policy Research* 48-51.

TC Chineke and EC Igwiro, "Urban and Rural Electrification: Enhancing the Energy Sector in Nigeria using Photovoltaic Technology" (2008) 9:1 *African Journal of Science and Technology* 102-108.

UB Akuru and OI Okoro, "Renewable Energy Investment in Nigeria: A review of the Renewable Energy Master Plan" (2014) 25:3 *Journal of Energy in Southern Africa*.

UJ Orji, "An Appraisal of the Legal Framework for the Control of Environmental Pollution in Nigeria" (2012) 38 *Commonwealth Law Bulletin* 321.

Usenobong F. Akpan and Godwin E. Akpan, "The Contribution of Energy Consumption to Climate Change: A Feasible Policy Direction" (2012) 2:1 *International Journal of Energy Economics and Policy*.

VC Sharma and A Sharma, "Nigeria's Primary Energy Reserves: Domestic Consumption and Future Outlook" (1991) 16:5 *Energy* 817-822.

Vuk Jeremic and Jeffrey D Sachs, "The United Nations in the Age of Sustainable Development" (2014) 45:2 *The Economic and Social Review*.

CONFERENCE PROCEEDINGS AND BACKGROUND PAPERS

A Walker, "What is Boko Haram?" (2012) *United States Institute of Peace Special Report*.

Christoph Bohringer, "The Kyoto Protocol: A Review and Perspectives", *Climate Policy Network Discussion Paper No. 04-01*.

Report of the United Nations Conference on Environment and Development held at Rio de Janeiro from 3 to 14 June, 1992. Agenda 21 UNGA A/RES/47/190, Preamble to Chapter 1 of Rio Declaration on Environment and Development, A/CONF.151/26 (Vol. 1), [UNCED].

Muhammed Tawfiq Ladan, "Policy, Legislative and Regulatory Challenges in Promoting Efficient and Renewable Energy for Sustainable Development and Climate Change Mitigation in Nigeria" (Paper delivered at the 3rd Symposium and 2nd Scientific Conference of ASSELLAU, University of Nairobi, Kenya, 23-25 March 2009) 15.

NI Chigbue, "Reform of Electric Power Sector: Journey so Far" (Lecture delivered at the US Africa Collaboration Research Sponsored by the National Science Foundation in Abuja, Nigeria, 2006) 3.

P Chylek, et al., 1st International Conference on Global Warming and the Next Ice Age, *Conference Proceedings, Halifax, Nova Scotia, Canada, 19-24 August 2001* (Halifax: Dalhousie University, 2001).

PO Oluseyi, TO Akinbulire and COA Awosope, "Energy Efficiency in the Third World: The Demand-side Management (DSM Option)" (Paper delivered at the Conference Internationale des Energies Renouvelables, Hammamet, Tunisia, 4-6 November 2007).

The Guardian, "Nigerian Power Breakthrough provides new hope for Millions" The Guardian (2 October 2013) online: The Guardian News: <<http://www.theguardian.com/global-development-professionals-network/adam-smith-international-partner-zone/nigerian-power-breakthrough-global-development>>

TO Akinbulire, COA Awosope & PO Oluseyi, "Solving the technical problems facing electrical energy development in Nigeria" (Paper delivered at the 3rd Annual Conference Research and Fair of the University of Lagos, Nigeria, 3 December 2007).

World Economic Forum, "The New Energy Security Paradigm" (2006) Energy Vision Update.

ONLINE ARTICLES

A. Adisianya, "Nigeria's Energy Security: Thinking Nuclear" Saharareporters (31 March 2014) online: Saharareporters News: <<http://saharareporters.com/article/nigeria-energy-security-thinking-nuclear>>

Abdullah Toukan & Anthony Cordesman, "Options in Dealing with Iran's Nuclear Program" (2010) Center for Strategic and International Studies. Online: <http://csis.org/files/publication/100323_Options_todealwith_Iran.pdf>

Angela Greiling Keane and Justin Sink, "U.S. Will Keep Commitments in Paris Climate Deal, Obama Says" Bloomberg L.P (1 December 2015) online:
<<http://www.bloomberg.com/politics/articles/2015-12-01/u-s-will-keep-commitments-in-paris-climate-deal-obama-says>>

A. Averchenkova, "The Outcomes of Copenhagen: The Negotiations and The Accord" (2010) UNDP Environment and Energy Group, Climate IPolicy Series:
<<http://www.undpcc.org/documents/p/1376.aspx>>

Aaron Sayne, "Climate Change Adaptation and Conflict in Nigeria" (2011) United States Institute of Peace online: <http://www.usip.org/sites/default/files/Climate_Change_Nigeria.pdf>

Atlantic Council, Energy for Water and Water for Energy (2011) online:
<<http://www.cus.org/publication/energy-water-and-water-energy>>

Berlin summit agenda "2007 Canada-EU Summit Statement, Berlin," 4 June 2007 (2007 Canada-EU Summit Statement) <http://www.canadainternational.gc.ca/eu-ue/bilateral_relations_bilaterales/2007_06_04_statement-declaration.aspx?lang=eng>

British Broadcasting Corporation, "Germany country profile" BBC News (12 February 2016) Online: <<http://www.bbc.com/news/world-europe-17299607>>

Building Nigeria's Response to Climate Change, "Climate Change Information on Nigeria" (2008) online: BNRCC <<http://www.nigeriaclimatechange.org/ccinfo.php>>

Council for Renewable Energy of Nigeria, "Nigeria Electricity Crunch" (2009), online:
<www.renewablenigeria.org>

Carbon Brief CLEAR ON CLIMATE CHANGE, "Paris 2015: Tracking country climate pledges" (2015) Carbon Brief online: <<http://www.carbonbrief.org/paris-2015-tracking-country-climate-pledges#>>

Craig Morris and Martin Pehnt, Energy Transition: The German Energiewende (Berlin: Heinrich Böll Stiftung, 2015) Online: <http://energytransition.de/wp-content/themes/boell/pdf/en/German-Energy-Transition_en.pdf>

Center for Naval Analysis, "Ensuring America's Freedom of Movement: A National Security Imperative to Reduce U.S. Oil Independence" (2011) CNA Corporation online:
<<http://www.cna.org/EnsuringFreedomofMovement>>

C Ochayi, "FG Canvasses Foreign Investments in Power Sector...Says Sector requires \$10 Billion In 5 Years" *The Vanguard* (3 February 2014) online: Vanguard News:

<<http://www.vanguard.com/2014/02/fg-canvasses-foreign-investments-power-sector-says-sector-requires-10-billion-5-years/#sthash.FkNJtAvP.dpuf>>

Christian Vrolijk, "The Marrakesh Accords: A Brief Point-by-Point Description and Comments" (2002) Online: <www.riia.org/Research/eep/climate.html>

Chika Amanze-Nwachuku, "Can Nigeria End Fuel Importation in 24 Months?" This Day Live (19 June 2012) online: This Day Live: <<http://www.thisdaylive.com/articles/can-nigeria-end-fuel-importation-in-24-months-/118241/>>

Chukunonye Akujuru and Newman Chintuwa Enyioko, "True Federalism and Sustainable Development in Nigeria (A Discourse on National Question and/or National Maladies)" (2013) Social Science Research Network, online: <SSRN <http://ssrn.com/abstract=2336606>>

"2007 Brussels European Council's summit – Council of the European Union, Brussels," 2 May 2007 (2007 Brussels European Council's summit – Presidency Conclusions) <http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/ec/93135.pdf>

Daily Independent, "Environmentalism urges President Jonathan to sign Climate Change Bill" Daily Independent (28 July 2014) online: <<http://dailyindependentnig.com/2014/07/environmentalist-urges-jonathan-sign-climate-change-bill/>>

Dan Smith and Janani Vivekananda, "A CLIMATE OF CONFLICT: The links between climate change, peace and war" (2007) International Alert online: <http://www.international-alert.org/sites/default/files/ClimateChange_ClimateOfConflict_EN_2007_0.pdf>

Donald Anthony Mwiturubani et al., "Climate Change and Natural Resources Conflicts in Africa" (2010) Institute for Security Studies online: <<https://www.issafrica.org/uploads/Mono170.pdf>>

D Stover, "In Hot Water: The "Other" Global Warming" Bulletin of the Atomic Scientists (15 February 2012) online: <<http://www.thebulletin.org/web-edition/columnists/dawn-stover/hot-water-the-other-global-warming>>

Dilip Ahuja and Marika Tatsutani, "Sustainable energy for developing countries" (2009) 2:1 S.A.P.I.EN.S [Online] <<http://sapiens.revues.org/823>>

Elliot Diringer, "Summary of COP 15 and CMP 5" (2009) Pew Center on Global Climate Change Online: <<http://www.c2es.org/docUploads/copenhagen-cop15-summary.pdf>>

Energy Commission of Nigeria, "About ECN" online: Energy Commission of Nigeria <http://www.energy.gov.ng/index.php?option=com_content&view=article&id=48&Itemid=53>

European Commission, “Paris Agreement” online:

<http://ec.europa.eu/clima/policies/international/negotiations/future/index_en.htm>

European Parliament, European Energy Security Strategy (Brussels: European Commission, 2015) online: <<http://www.europarl.europa.eu/EPRS/EPRS-AaG-559474-European-Energy-Security-Strategy-FINAL.pdf>>

Erwin Jackson and Will McGoldrick, “Global climate policy post-Copenhagen: Progress and Prospects” (2010) The Climate Institute Online: <www.climateinstitute.org.au>

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, “Key Elements of an Integrated Energy and Climate Programme - Decision of German Cabinet on August 23rd/24th 2007 at Meseberg” Online: <http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/klimapaket_aug2007_en.pdf>

Graham Floater et al., “Cities and the New Climate Economy: the transformative role of global urban growth” The Global Commission on the Economy and Climate – The New Climate Economy online: <<https://files.lsecities.net/files/2014/12/The-Transformative-Role-of-Global-Urban-Growth-01.pdf>>

Greg Odogwu, “COP 19: From Prince Fadina to Hamzat Lawal” The Punch (12 December 2013) online: <<http://www.punchng.com/opinion/cop-19-from-prince-fadina-to-hamzat-lawal/>>

Harriet Torry, “Germany, France to Push for Ambitious U.N. Climate Agreement at Paris Summit” The Wall Street Journal (19 May 2015) The Wall Street Journal online: <<http://www.wsj.com/articles/germany-france-to-push-for-ambitious-u-n-climate-agreement-at-paris-summit-1432051898>>

HE Daly, “Boundless bull” (1990a) 4:3 Gannett Center Journal 113-118.

HE Daly, “Towards some operational principles of sustainable development” (1990b) 2 Ecological Economics 1–6.

Ian Traynor and Arthur Neslen, “Ambitious EU Blueprint for Energy Union to loosen Russian grip on Gas” The Guardian (24 February 2015) online: The Guardian: <<http://www.theguardian.com/world/2015/feb/24/eu-blueprint-energy-union-russian-gas-gazprom-maros-sefcovic>>

International Energy Agency, *Oil and Gas Security: Emergency Response of IEA Countries – Germany* (Paris: International Energy Agency Publications, 2012) Online: <<http://www.iea.org/publications/freepublications/publication/germanyoss.pdf>>

J. Furman et al, "An Economic Strategy to Address Climate Change and Promote Energy Security" Brookings Institution (2007):
<http://www.brookings.edu/papers/2007/10climatechange_furman.aspx>

J Gullledge & W Rogers, "Lost in Translation: Closing the Gap between Climate Science and National Security Policy" (2010) Center for New American Security Online:
<<http://www.cnas.org/node/4391>>

Jennifer Duggan, "China climate negotiator says Lima deal 'balanced'" The Guardian (15 December 2014) online: <<http://www.theguardian.com/environment/chinas-choice/2014/dec/16/china-climate-negotiator-says-lima-deal-balanced>>

Jorrits Rients Oppewal, "Energy Security in Nigeria" (2011) Istituto Per Gli Studi Di Politica Internazionale 1, online: ISPI <http://www.ispionline.it/it/documents/Analysis_86_2011.pdf>

Leonid Bershidsky, "Germany's Green Energy is an Expensive Success" Bloomberg View (22 September, 2014) online: <<http://www.bloombergvew.com/articles/2014-09-22/germany-s-green-energy-is-an-expensive-success>>

Lindsay F Wiley and Lawrence O Gostin, "The International Response to Climate Change: An Agenda for Global Health" (2009) Georgetown Law Faculty Publications online:
<<http://scholarship.law.georgetown.edu/facpub/16>>

Matthew Karnitschnig, "Germany's Expensive Gamble on Renewable Energy" The Wall Street Journal (26 August, 2014) online: <<http://www.wsj.com/articles/germanys-expensive-gamble-on-renewable-energy-1409106602>>

Michael L. Ross, "How the 1973 Oil Embargo Saved the Planet" Foreign Affairs (October 15, 2013) online: <<https://www.foreignaffairs.com/articles/north-america/2013-10-15/how-1973-oil-embargo-saved-planet>>

M. Werz and L. Conley, "Climate Change Migration and Conflict in Northwest Africa: Rising Dangers and Policy Options across the Arc of Tension," (2012) Center for American Progress online: <http://www.americanprogress.org/issues/2012/04/climate_migration_nwafrica.html>

Meles Zenawi, "Climate change will hit Africa hardest" The Guardian (28 November 2009) The Guardian online: <www.theguardian.com/commentisfree/cif-green/2009/nov/28/africa-climate-change>

Michael Jacobs, "Lima deal represents a fundamental change in global climate change regime" The Guardian (15 December 2014) online:

<<http://www.theguardian.com/environment/2014/dec/15/lima-deal-represents-a-fundamental-change-in-global-climate-regime>>

Michal Nachmany et al., The 2015 Global Climate Legislation Study A Review of Climate Change Legislation in 99 Countries (London: The London School of Economics and Political Science Graham Research Institute on Climate Change and the Environment, 2015) online:

<http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/Global_climate_legislation_study_20151.pdf>

Nancy E Brune, “Water-Energy-Security Nexus”, Presentation delivered in Stockholm, Sweden, (August 2011) online:

<http://www.worldwaterweek.org/documents/WWW_PDF/2011/Wednesday/T6/The-Water-Energy-Security-Nexus-Implication-for-Urban/The-security-implications-of-water-and-energy.pdf>

Nicholas St. Fleur, “The Road to a Paris Climate Deal” The New York Times (2 December 2015) online: <<http://www.nytimes.com/interactive/projects/cp/climate/2015-paris-climate-talks>>

Nigerian National Petroleum Corporation, History of the Nigerian Petroleum Industry, online: NNPC

<<http://www.nnpcgroup.com/NNPCBusiness/BusinessInformation/OilGasinNigeria/IndustryHistory.aspx>>

Nnena Ezeah, “Nigeria’s Crude Production Peaks at about 2.68M bpd”, The Vanguard (27 February 2012) online: Vanguard News: <<http://www.vanguardngr.com/2012/02/nigerias-crude-production-peaks-at-about-2-68m-bpd/>>

Onyekachi Duru, “An Appraisal of the Legal Framework for the Regulation of Nigerian Oil and Gas Industry, with Appropriate Recommendations” (2011) Social Science Electronic Publishing Online: <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2137979>

Peter Fairley, “Germany’s Grid: Renewable-Rich and Rock-Solid” IEEE Spectrum (28 August 2014) online: <<http://spectrum.ieee.org/energywise/energy/the-smarter-grid/germanys-superstable-solarsoaked-grid>>

Robert Kunzig, “HOW DO WE FIX IT? Germany Could Be a Model for How We’ll Get Power in the Future” National Geographic (15 October, 2015) National Geographic online:

<<http://ngm.nationalgeographic.com/2015/11/climate-change/germany-renewable-energy-revolution-text>>

S. Mantshantsha, "South Sudan says it will build oil pipelines worth \$4 billion," Bloomberg News (June 7, 2012) Bloomberg News online: <<http://www.bloomberg.com/news/2012-06-07/south-sudan-says-it-will-build-oil-pipelines-worth-4-billion.html>>

Simon Rogers, "World carbon emissions: the league table of every country" The Guardian (21 June 2012) Online: <<http://www.theguardian.com/environment/datablog/2012/jun/21/world-carbon-emissions-league-table-country>>

SO Oyedepo, "Energy and sustainable development in Nigeria: the way forward" (2012) 2:15 Energy, Sustainability and Society 1 [Online]:
<<http://www.energysustainsoc.com/content/pdf/2192-0567-2-15.pdf>>

Sören Amelang and Kerstine Appunn, "COP21 - Media on Germany and the Paris Climate Summit" Clean Energy Wire (15 December 2015) Clean Energy Wire online:
<<https://www.cleanenergywire.org/factsheets/cop21-media-germany-and-paris-climate-summit>>

Steve Bloomfield, "Africa 'will be worst hit by climate change'" Independent (5 November 2006) Independent online: <<http://www.independent.co.uk/environment/climate-change/africa-will-be-worst-hit-by-climate-change-423143.html>>

Suzanne Goldenberg, "Lima climate change talks end in agreement - but who won?" The Guardian (14 December 2014) online:
<<http://www.theguardian.com/environment/2014/dec/14/lima-climate-change-talks-who-won>>

The UK Ministry of Defence, "Global Strategic Trends – Out to 2040" (12 January 2010) online: UK Ministry of Defence
<https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/33717/GST4_v9_Feb10.pdf>

The Economist, "Nigeria, Africa's new Number One - Nigeria's suddenly supersized economy is indeed a wonder; but so are its still-huge problems" The Economist (12 April 2014) Online:
<<http://www.economist.com/news/leaders/21600685-nigerias-suddenly-supersized-economy-in>

The Economist, "Energy: When the wind blows" The Economist (28 November 2015) online:
<<http://www.economist.com/news/special-report/21678955-renewable-power-good-more-renewable-power-not-always-better-when-wind-blowsdeed-wonder-so-are-its-still-huge>>

The Federal Government of Germany, "Energy and Climate Protection Programme" online: The Press and Information Office of the Federal Government

<<http://www.bundesregierung.de/Content/EN/StatischeSeiten/Schwerpunkte/Energie-der-Zukunft/einstiegsartikel-energie-der-zukunft.htm>>

The World Bank, Data, online: WBG

<http://data.worldbank.org/indicator/SP.POP.TOTL?cid=GDP_1>

United States Energy Information Administration, “Nigeria – Analysis” (30 December 2013), online: US EIA <<http://www.eia.gov/countries/analysisbriefs/Nigeria/nigeria.pdf>>

US Energy Information Administration, “Country Analysis Brief: Nigeria” U.S EIA Online: <http://www.eia.gov/beta/international/analysis_includes/countries_long/Nigeria/nigeria.pdf>

Vanguard, “Nigeria Ranked High in Implementation of Environmental Agreements”, Vanguard (2 September 2013) online: <<http://www.vanguardngr.com/2013/09/nigeria-ranked-high-on-implementation-of-environmental-agreements/>>

Vanguard, “Nigeria’s oil reserves drops to 35 billion barrels” The Vanguard (19 March 2014) online: Vanguard News: <<http://www.vanguardngr.com/2014/03/nigeria-oil-reserve-drops-35-bn-barrels/>>

Vera Songwe, “The EU-Africa Summit: Why Germany Should Take Center Stage” Brookings Institution (3 April 2014) Online:<<http://www.brookings.edu/blogs/africa-in-focus/posts/2014/04/03-germany-european-union-africa-summit-songwe>>

World Bank Report, “Turn down the Heat: Why a 4 Degree Centigrade World Must be Avoided” (2012); available at <climatechange.worldbank.org/sites/default/files/Turn_Down_the_heat_Why_a_4_degree_centigrade_warmer_world_must_be_avoided.pdf>

