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Contents

Addressing The Capacity Deficiency in the Nigerian Off-Grid Renewable Electricity: The Place of the International Climate Change Regime

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Abstract

This paper analyses the United Nations Framework Convention on Climate Change (later referred to as UNFCCC) 1992 and, the Kyoto Protocol 1997, to determine the role it plays in addressing the lack of technological capacity to innovate, manufacture and maintain Off-grid renewable electricity (OGRE) technologies in Nigeria. It finds that they provide for the obligations of developed member states to take practicable steps to transfer environmentally sound technological know-how (including OGRE technologies) to developing member states like Nigeria. Regardless of the above provision, no single OGRE has been transferred to Nigeria in furtherance of its provisions. It is argued that the absence of the definition of the practical steps to be adopted by developed member states in the relevant UNFCCC 1992 provisions is a barrier. The Paris Agreement 2015 is an amendment of the UNFCCC 1992. The Paris Agreement is analysed to see whether it is a progression of the UNFCCC and Kyoto Protocol with respect to its role in addressing the capacity barrier to the development of OGRE in Nigeria. The author bolsters confidence in the following changes made under the Paris Agreement 2015. It provides for a future framework for technology transfer and development. It is argued that this may lay to rest the conundrum of the absence of a practical framework for the transfer of environmentally sound technologies (ESTs) including OGRE know-how to Nigeria, under the UNFCCC 1992. It also provides separately for obligation on developing and

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transitioning member states to contribute to technological capacity development in developing member states like Nigeria. Thus, it is argued that the Paris Agreement would no doubt contribute to addressing the capacity problems in the Nigerian OGRE sector. Regardless, there are several factors that whittle down its prospects in this context, the chief of them being the absence of an obligation on states to transfer technological know-how (including OGRE) to developing member states like Nigeria.
Keywords: Off-grid Renewable Electricity, The Paris Agreement 2015, The UNFCCC 1992,

1. Introduction

There is a paradoxical situation of lack of access to electricity amidst abundant electricity sources in Nigeria.[1] The problem is more severe in remote rural areas in comparison to urban areas. It is for this reason that the National Renewable Energy and Energy Efficiency Policy (NREEEP) 2015 opines that, 'electricity supply in rural areas are largely non-existent, denying access to such things as lighting and refrigeration for most of the nations.'[2] Even the limited access is tainted by the unreliability and unsustainability of the electricity supplied.[3] This paper will identify the fact that the electricity supply problems are occasioned by the nature of the national electricity grid in Nigeria.[4] It will be mentioned that the nature of the Nigerian national grid makes it particularly unsuitable for the electrification of remote rural areas.[5] What is more, the electricity grid is majorly based on gas electricity, renowned for

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1 Abubakar Sadiq Aliyu and others, 'Nigerian Electricity Crisis: Power Generation Capacity Expansion and Environmental Ramifications' (2013) 61 Energy 354.

2 National Renewable Energy and, Energy Efficiency Policy 2015 (NG), 7.

3 Oseloka Obaze, *Prime Witness: Change and Policy Challenges in Buhariís Nigeria* (Safaris Book 2017) 211. See Olatomiwa and others, 'Economic Evaluation of Hybrid Energy Systems for Rural Electrification in Six Geo-Political Zones of Nigeria' (2015) 83 Renewable Energy 435, 437.

4 Ngozi Chinwa Ole, 'The Paris Agreement 2015 as a Primer for Developing Nigerian Off-grid Solar Electricity' (2018) 26 (3) African Journal of International and Comparative Law 426.

5 Ngozi Chinwa Ole, 'The Combating Electricity Poverty through Off-grid Renewable: The Role of Developed Member Financial Support under the International Climate Change Agreement' (2017) 2(1) *International Journal of Sociology and Humanities* 1.

exacerbating environmental pollution through the emission of greenhouse gases.[6]

Given the failure of the current national electricity system, the NREEEP 2015 recommends that Off-Grid Renewable Electricity (OGRE) remains a better option for reliable and sustainable electrification of remote rural areas in Nigeria.[7] Notwithstanding, the development of OGRE is limited compared to what it can and, should be.[8] It will be identified that there is an absence of the technological capacity to innovate, manufacture, and, maintain OGRE.[9] The existence of the above capacity barrier impedes the development of OGRE. Nigeria is a party to some international instruments relevant to addressing the problem of lack of capacity to innovate, manufacture, and, maintain OGRE.[10] They are international climate change instruments.[11] The international climate change instruments include the United Nations Framework Convention on Climate Change (later referred to as UNFCCC)

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6 World Energy Council, 'World Energy Resources 2013' (2013) 14< https://www.worldenergy.org/wp-content/uploads/2013/09/Complete _WER_2013_Survey.pdf> accessed 15 February 2019. Parsoon Akhgari and others, 'Economical-Environmental Evaluation of Natural Gas and Renewable Energy Systems' (2013) Int. J. Energy Res 1550. A K Akella and others, 'Social, Economic and Environmental Impacts of Renewable Energy Systems' (2009)34 Renewable Energy 390.

7 NREEEP 2015 (n 2) 18.

8 Juluis Elusakin and others, 'Challenges of Sustaining Off-grid Power Generation in Nigeria Rural Communities' (2014) 2(2) African Journal of Engineering Research 51.

9 Efurumibe E L, 'Barriers to the Development of Renewable Energy in Nigeria' (2013) 2(1) Scholarly Journals of Biotechnology 11, 12.

10 Adrian J Bradbook, 'International Law and Renewable Energy: Filing the Void' in in D.N. Zillmann and others (eds) *Beyond the Carbon Economy: Energy Law in Transition* (Oxford: Oxford University Press 2008) 235.

11 Nigeria ratified the United Nations Framework Convention on Climate Change 1992 in 29 November 1994. UN, 'Status of Ratification of the Convention' (2014) <http://unfccc.int/convention/status of ratification.php>accessed 7 April 2018. Nigeria ratified the Paris Climate Change Agreement in 16th May 2017, it entered into force on the 15th June 2017. See UNFCCC, 'Paris Agreement: Status of Ratification' < http://unfccc.int/paris_agreement/items/9444.php> accessed 7 April 2018. For more commentaries on the international climate change agreement, See Daniel Bodensky, 'The International Climate Change Regime: The Road from Copenhagen' (2010) Harvard Projects on Climate Change Agreements < http://belfercenter. ksg.harvard.edu/files/Bodansky-VP-October-2010-3.pdf>1-7, accessed 7 February 2019. See also Christiana Figueres and Maria Ivanova, 'Climate Change: National Interest or a Global Regime' (2013) 6 Global Environmental Governance 7.

1992, the Kyoto Protocol 1997 and the Paris Climate Change Agreement (later referred to as Paris Agreement) 2015.[12] The UNFCCC 1992 was the first international treaty[13] that coordinates legal responses for addressing the problem of climate change.[14] The UNFCCC 1992 provides for the adoption of protocols pursuant to its provisions.[15] The Kyoto Protocol 1997 contains a detailing of the obligations of developed member states in achieving the provisions of the UNFCCC 1992.[16] The Paris Agreement was adopted in 2015 as an amendment to the UNFCCC 1992.[17] These international treaties contain the contributions of other states to the development of technological capacity in Environmentally Sound Technologies (ESTs) sector (including OGRE) to developing member states like Nigeria.[18] The Paris Agreement specifically provides for the contribution of other states to capacity building in environmentally sound energy in developing member countries, including Nigeria. OGRE is a better option in comparison to gas-electricity strategy for mitigating climate change in the electricity sector in Nigeria.[19] The latter makes the regime relevant to the removal of the capacity problems that impede the development of OGRE in Nigeria.

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12 CINNAMON P CARLENE AND OTHERS, 'INTERNATIONAL CLIMATE CHANGE LAW: MAPPING THE FIELD' IN *THE OXFORD HANDBOOK OF INTERNATIONAL CLIMATE CHANGE LAW* (OXFORD UNIVERSITY PRESS 2016) 7-13.

13 There are currently 194 parties to the UNFCCC 1992. See UNFCCC, 'Fact Sheet: An Introduction to The UNFCCC and its Kyoto Protocol'<www.cinu.mx /minisitio/cop16/unfccc_and _kyoto_ protocol pdf> accessed 3 February 2019.

14 Peter Janosi, 'GHG Reduction Targets: What Sort and How Soon?' (1994) ARIASA 2.

15 The UNFCCC (n 11) Art 17. It provides that member states may adopt protocols in furtherance to its provisions.

16 The term protocol has been defined in the United Nations Reference Guide as 'A Protocol based on a Framework Treaty is an instrument with specific substantive obligations that implements the general objectives of a previous framework or umbrella convention'. See United Nations, 'Definition of Key Terms used in the UN Treaty Collections' <https://treaties.un.org/Pages/Overview .aspx?path=overview/ definition/ page1_en.xml#protocols> accessed 7th February 2019.

17 The Paris Climate Change International Agreement 2015 (adopted 12 December 2015, entry into force date is 4 November 2016) Art 22.

18 The UNFCCC (n 11) Art 4(3) (7).

19 Steven Ferrey, 'The Failure of International Global Warming Regulation to Promote Needed Renewable Energy' (2010) 37(1) B.C. Envtl. Aff. L. Rev. 67. Ngozi Chinwa Ole, 'The Paris Agreement 2015 as a Primer for Developing Nigerian Off-grid Solar Electricity' (n 4).

In the light of the above, the key research question to be considered in this chapter is: what is the place of these instruments in contributing to addressing the lack of capacity to innovate, manufacture and maintain OGRE in Nigeria? It will be argued that some factors limit the extent to which these instruments could effectively address the capacity barrier of OGRE in Nigerian. First, the absence of the definition of the practical steps for the transfer of ESTs and know-how to developing member states under the UNFCCC 1992 regime constrains the effectiveness of the regime in this regard. The Paris Agreement 2015 will be examined to see whether it is a progression of the UNFCCC 1992 in the context of its role in addressing the identified capacity barrier in the OGRE sector. It provides a foundation for the adoption of a future framework for co-operation among members in the area of technology development and transfer, including OGRE. It provides an obligation for member states to assist with financial support to enable developing member states to make the most of the provision of technology development and, transfer. There is also a separate obligation on developed states and, transitioning states to assist developing member states in the area of developing the technological capacity for ESTs, which, in the case of Nigeria includes OGRE. However, it will be argued that the progress made in the Paris Agreement is whittled down by several other provisions. The chief of them is the general absence of an obligation on developed and transitioning member states to transfer ESTs to developing member states like Nigeria.

This work is divided into four to expand on the central theme. Section one is the introduction. Section two contains an expatiation of the case for and, barriers to the development of OGRE. Section three contains an analysis of the UNFCCC 1992 and the Kyoto Protocol 1997 in the light of the central research theme. Section three contains an analysis of the Paris Agreement 2015 to determine whether it is better placed for addressing the problem of lack of technological capacity in the Nigerian OGRE sector. The final section contains the concluding remarks.

2. Exigencies and Barriers to the Development of OGRE

Nigeria is a country that has a colossal amount of conventional and renewable electricity sources.[20] Notwithstanding, there is a lack of

[20] C O Osueke and C A Ezeugwu, 'Study of Nigeria Energy Resources and Its Consumption' (2011) 2(12) International Journal of Scientific & Engineering Research 1.

access to reliable electricity supply in Nigeria.[21] In 2018, only 55% of the Nigerian population had access to electricity.[22] Even the limited access to electricity is characterised by power shortages[23] and limited power supply.[24] The Nigerian electricity is centralised given that electricity is generated primarily from large thermal-gas plants and, secondarily from hydropower plants.[25] Consequently, it is distributed to consumers across the country through a Nigerian national grid (NNG).[26] A cause of the problem of lack of electricity is the unsuitability of the national grid for the electrification of remote rural areas in Nigeria.[27]

The term 'remote rural areas' is defined as 'not necessarily limited to a location that is far away from the grid, but it includes any site where it is not economically or physically feasible to extend the grid network due to bad terrain and topography which characterizes most rural villages and topographies in Nigeria'.[28] For such remote rural areas, the national grid system of electrification is discountenanced as the preferred form of electrification.[29]

On the one hand, the Nigerian National Renewable Energy and Energy Efficiency Policy (NREEEP) 2015 recognises that the best

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21 Kabiru K Salami and Adigun Agbaje, 'Energy Struggle and City Life in Africa' in Yinka Omeregbe and Ada Ordor (eds), *Ending Africa's Energy Deficit and the Law: Achieving Sustainable Energy for All in Africa* (Oxford University Press 2018) 293.

22 USAID, 'Nigerian Power African Fact Sheet' (2018) <www.usaid.gov/powerafrica/nigeria> accessed 11 February 2019.

23 Udeme Akpan and others, 'Electricity Supply Worsens in Q1 2018' (2018) <www.vanguardngr.com/2018/04/electricity-supply-worsens-q1-2018/> accessed 11th February 2019. See Chigbue Nnenna, *Reform of Electric Power Sector: Journey So Far* (National Science Foundation Nigeria 2006) 3.

24 Ise Olurunkanmi Joseph, 'Issues and Challenges in the Privatized Power Sector in Nigeria' (2014) 6(1) Journal of Strategic Security 161, 162.

25 The Nigerian Federal Ministry of Power, Electricity Year Book (Government Press 2013) 17.

26 U P Onochie and others, 'The Nigeria Electric Power Sector (Opportunities and Challenges)' (2015) 2 Journal of Management and Engineering Science Technology 494, 495.

27 I M Bugaje, 'Remote Area Power Supply in Nigeria: The Prospects of Solar Energy' (1999)18 Renewable Energy 491, 492.

28 L Olatomiwa and others, 'Economic Evaluation of Hybrid Energy Systems for Rural Electrification in Six Geo-Political Zones of Nigeria' (2015) 83 Renewable Energy 435, 437. 436.

29 Marilyn Chikaodili Amobi, 'Deregulating the Electricity Industry in Nigeria: Lessons from the British Reform' (2007) 41 Socio-Eco Planning Sciences 291, 294.

form of electrification for remote rural areas in Nigeria is 'Off-grid Renewable Electricity (OGRE).'[30] OGRE refers to the production of electricity from decentralised renewable energy sources, using smaller electricity plants at or near the place of sale and its distribution directly to end users without connecting to a national grid.[31] Its decentralised nature confers its a superior benefit for the electrification of remote rural areas in comparison to the national grid. The unsuitability of the national grid system for the electrification of remote rural areas has already been mentioned. Electricity from the national grid normally passes through three stages before reaching the end users: generation, transmission, and distribution stages.[32] It is the use of transmission and distribution networks, which renders the national grid unsuitable for remote rural areas.[33] As stated earlier on in this chapter, most rural areas in Nigeria are characterized by low population density and a sparse settlement requiring lower electricity loads.[34] The latter makes it highly uneconomical for the extension of transmission and distribution networks to such rural areas.[35] For some remote rural areas, it is not physically possible with the current state of technology to extend the transmission and distribution networks to such areas.[36] In comparison, most OGRE system does not require distribution and transmission networks.[37] It is for this reason that the NREEEP 2015 recommends them as the most viable option for

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30 NREEEP 2015 (n 2) 18.

31 K R Ajao and others, 'Electric Energy Supply in Nigeria, Decentralized Energy Approach' (2009) 24(4) Cogeneration and Distributed Generation Journal 42. OGRE encompasses standalone and mini-grid electricity technologies. See Salahuddin Qazi, 'Fundamentals of Standalone Photovoltaic Systems' in Salahuddin Qazi (ed), *Standalone Photovoltaic (PV) Systems for Disaster Relief and Remote Areas* (Elsevier 2016) 31; International Electrotechnical Commission, 'Recommendations for Small Renewable Energy and Hybrid Systems for Rural Electrification' (2013) <http://webstore.iec.ch/ webstore/ webstore. nsf/artnum /048 704opendocument> accessed 11 February 2019.

32 Juluis Elusakin and others, 'Challenges of Sustaining Off-grid Power Generation in Nigeria Rural Communities' (n 8).

33 Ibid.

34 Ibid.

35 Akpan Uduak and others, 'Electricity Access in Nigeria is Off-Grid Electrification using Solar Photovoltaic Panels Economically Viable?' (2008) < http://spidersolutionsnigeria.com/wp- content /uploads/2012/12/electric ity-access-in-nigeria1.pdf> accessed 5 February 2019.

36 NREEEP 2015 (n 2), 18-19.

37 Thomas B Johansson and others, *Innovating Energy Access for Remote Areas: Discovering Untapped Resources: Proceedings of the International Conference* (Business and Economics 2012) 1641.

the electrification of remote rural areas.[38] Additionally, OGRE is an environmentally friendly electricity option in comparison to gas electricity options. [39] As such, it is a preferred option of electrification, particularly in the light of mitigating the global problem of climate change.[40]

Notwithstanding this, the current development of OGRE is negligible compared to what it could and should be in Nigeria.[41] OGRE is opened up for private investors[42] because of the electricity privatisation in 2005.[43] There is a shortage of informed literature as to the exact scale of its development in Nigeria. However, there exists a consensus that it is currently underdeveloped.[44] Elusakin states that 'off-grid technologies which majorly has a link with renewable technologies such as solar and hydro are not being pronounced in Nigeria like East Asian and Pacific countries.'[45] Their development is currently below 1% of the national electricity mix.[46] The dismal state of OGRE evidences the existence of barriers to the development in the sector.

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38 NREEEP 2015 (n 2).

39 C Gouvello and others, 'The Limitations of the Conventional Grid: Bank on Complementarity' in C Gouvello and Y Maigne (eds), *Decentralised Rural Electrification: An opportunity for Mankind, Technique for the Planet* (Systemes Solaire 2002) 127,128. H Hondo, 'Life Cycle GHG Emission Analysis of Power Generation Systems—Japanese Case' (2005) 30 Energy 2042.

40 Theocharis Tsoutsos and others, 'Environmental Impacts from the Solar Energy Technology (2005) 33 Energy Policy 289.

41 Nigerian Energy Support Programme, *The Nigerian Energy Sector - an Overview with a Special Emphasis on Renewable Energy, Energy Efficiency and Rural Electrification* (Deutsche Gesellschaft für 2014) 91.

42 Jan Glazewiski and others, 'Promoting Renewable Energy in African Countries' in Yinka Omeregbe and Ada Ordor (eds), *Ending Africa's Energy Deficit and the Law: Achieving Sustainable Energy for All in Africa* (n 21) 252.

43 Oyinkan Chukuka Tasie and Peter Kayode Oniemola, 'Legal Analysis of Liberalisation and Privitisation of State-Owned Companies in the Nigerian Power Sector' (2016) 27(5) ICCLR 141.

44 IRENA, *Off-grid Renewable Energy Systems: Status and Methodological Issues* (IRENA 2015) 16-17. SeeARE, 'Best Practices of the Alliance for Rural Electrification', Alliance for Rural Electrification <www.ruralelec.org/fileadmin/DATA/Documents/06_Publications/ARE_Best_Practises_2013FINA L.pdf>accessed 15 February 2019.

45 Julius Elusakin and others, 'Challenges of Sustaining Off-grid Power Generation in Nigerian Rural Communities' (n 8) 51.

46 E I Ohimain, 'Diversification of Nigerian Electricity Generation Sources' (2014) 10(3) Energy Sources, Part B: Economics, Planning, and Policy 300.

A barrier to the development of OGRE is the lack of technological capacity to innovate and manufacture its technologies.[47] As a result, a United Nations Environmental Programme (UNEP) study shows that there is no record of any manufacturing of renewable electricity technology in Nigeria.[48] Supplementing this, Dr. Huzi Isiaku, an expert in clean energy in Nigeria, notes that 'a range of high-tech renewable energy technologies exist, but these are not manufactured locally.'[49] Similarly, Nigeria Rural Electrification Agency (REA)[50] remarks that 'while there are many engineers and other technical professionals in Nigeria, there is a scarcity of qualified personnel for the maintenance of renewable and off-grid renewable applications.'[51] Thus, some OGRE projects end up as a dismal failure because of the absence of skilled manpower to maintain it.[52] The lack of technological capacity to innovate, manufacture and maintain undermine investors' and customers' confidence in investing and using OGRE technologies respectively.[53]

This section contains a discussion of the need for the development of OGRE beyond its current status in Nigeria. It is argued that the lack of capacity to innovate, manufacture, and maintain OGRE technologies limit its development in Nigeria. The next section contains an analysis of the role of the United Nations Climate

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47 Abubarkar Sambo, 'Renewable Energy Development in Nigeria' A Paper Presented by the President of the Energy Commission of Nigeria at the World Future Council \21-Strategy Workshop on Renewable Energy, Accra, Ghana, 21 24 June, 2010 (2010) 36 <http://area-net.org/wpcontent/upload/2016/01/E.BalaNigerian_Energy_Commission_renewable_energy_development_in_nigeria.pdf> accessed 27 February 2019.

48 UNEP, *Patent and Clean Energy Technologies in Africa* (UNEP 2014) 74.

49 Huzi I Mshelia, 'Energy Access for All: The Role of Clean Energy in Alleviating Poverty' (2014) 36 <https://ng.boell.org/sites/default/files/uploads/2013/10/clean_energygreen_deal_nigeria_study.pdf> accessed 15 February 2019.

50 The Rural Electrification Agency is the body that regulates and promotes off-grid electricity below 1 Megawatt or mini-grid of below 100 MWH in rural areas in Nigeria. See Electric Power Sector Reform Act 2005, s 88 (1) (9).

51 REA, *New National Rural Electrification Implementation Strategy and Plan 2014* (REA 2014) 10.

52 B Omisore, 'Nigeria's Solar Projects Yield Both Failure and Success' (2011)<http://news.nationalgeographic.com/news/energy/2011/11/111102-solar-power-in-nigeria/> accessed 12 February 2019.

53 The United Nations Framework Convention on Climate Change 1992 (n 11) Art 17.

Change 1992 and the Kyoto Protocol 1994 in addressing the capacity barrier to the development of OGRE in Nigeria.

3. The UNFCCC 1992 and the Kyoto Protocol 1994

3.1 Introduction

As previously stated, the UNFCCC 1992 is the first global instrument[54], which coordinates responses to the problem of climate change. [55] The Kyoto Protocol 1994 was adopted under its provisions.[56] Its ultimate objective is 'to achieve... the stabilization of greenhouse gas concentrations in the atmosphere...' [57] In furtherance of this objective, the UNFCCC provides that, 'All Parties... shall promote and cooperate in the development, application, and diffusion, including transfer, of technologies... that control, reduce or prevent anthropogenic emissions of greenhouse gases...'[58] The same provision is replicated in the Kyoto Protocol 1994.[59] The electricity sector contributes about 21% of estimated global GHG emissions.[60] Consequently, intensified action for the development of low-carbon technologies is required in the global electricity sector to mitigate climate change therein. [61] In the

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54 UNFCCC, 'Fact Sheet: An Introduction to the UNFCCC and its Kyoto Protocol' <www.cinu.mx/minisitio/cop16/unfccc_and _kyoto_protocol .pdf> accessed 15 February 2019.

55 Peter Janosi, 'GHG Reduction Targets: What Sort and How Soon?' (1994) ARIASA 2.

56 The UNFCCC 1992 (n 11) Art 17. It provides that member states may adopt protocols in furtherance to its provisions. The term 'protocol' is defined in the United Nations Reference Guide as 'A Protocol based on a Framework Treaty is an instrument with specific substantive obligations that implements the general objectives of a previous framework or umbrella convention'. See United Nations, 'Definition of Key Terms used in the UN Treaty Collections' <https://treaties.un.org/Pages/Overview.aspx?path=overview/definition/page1_en.xml#protocols > accessed 7 April 2018.

57 UNFCCC 1992 (n 11) Art 2. See Wei Xiong and others, 'Climate Change and Critical Thresholds in China's Food Security' (2007) 81 Climate Change 205.

58 Ibid, Arts 2 and 4(1) (C), Kyoto Protocol 1997 (adopted 11th December 1997, entered into force on 16th February 2005) Art 2(1) (a) (iv). See also Lindsey A Greene, 'United Nations Framework Convention on Climate Change' (2000) 108 (8) En HP A353.

59 The Kyoto Protocol 1997 (n 58) Art 10(c).

60 UNFCCC, 'UNFCCC Fact sheet: The Need for Mitigation' (November 2009) <https://unfccc.int/files/press/ backgrounders/application/pdf/press_factsh_mitigation.pdf> accessed 11 February 2019.

61 UNFCCC, 'Uniting on Climate' (2007) <http://unfccc.int/resource/docs/publications/unitingonclimate _eng.pdf accessed 11 February 2019. See IPCC Technical Support Unit for the

Nigerian context, OGRE has been identified as a choice for mitigating GHG emissions in the electricity sector, particularly in remote rural areas.[62] As such, the provisions of the UNFCCC create an impetus for OGRE development in Nigeria.

3.2 Technology Transfer Provisions

The UNFCCC 1992 provides for the obligations of developed member states to transfer Environmentally Sound Technologies (ESTs) to developing countries, including Nigeria. The concept of 'common but differentiated responsibility' is at the core of the UNFCCC 1992 provisions.[63] This refers to a recognition on the part of developed member states that they have played a leading role in environmental degradation and have a greater capacity to address it in comparison to developing countries.[64] In furtherance to the 'principle of common but differentiated responsibility', the UNFCCC 1992 provides that developed country parties shall take practicable steps to 'promote, facilitate and finance, as appropriate, the transfer of... environmentally sound technologies and know-how' to developing country parties.[65] The above provision is also replicated in the Kyoto Protocol 1997.[66] The Technology Executive Committee (TEC) and the Climate Technology Centre Network (CTCN)[67] were adopted as technology mechanisms in 2010 to assist

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Synthesis Report, *Climate Change 2014 Synthesis Report* (IPCC 2015) 99-103.

62 Section 2.

63 The UNFCCC 1992 (n 11) Art 3 and 4. See Douglas Bushey and Sikina Jinnah, 'Evolving Responsibility? The Principle of Common but Differentiated Responsibility in the UNFCCC' (2010) 6 Berkeley J. Int'l L. Publicist 1.

64 The Rio Declaration on Environment and Development 1992, Principle 7. It provides 'in view of the different contributions to global environmental degradation, states have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command'. See also L Hens, 'The Rio Declaration on Environment and Development' (2004) II Area Studies – Africa Regional Sustainable Development Review 1.

65 UNFCCC 1992 (n 11) Art 4(5); Kyoto Protocol 1997 (n 11) Arts 10(2), 11(2) (a). See also Zhong Fa Ma,'The Effectiveness of Kyoto Protocol and the Legal Institution for International Technology Transfer' (2012) 37 J Technol Transf 75, 77.

66 Kyoto Protocol 1997 (n 11) Art 11(2) (a) (b).

67 Ibid, para 117. See also UNFCCC, 'Technology Mechanism' (2015) <http://unfccc.int /ttclear/misc_/Static Files/gnwoerk_static/TEM/0e 7cc25f3f9843ccb98399df4d47e 219/174ad939936746b6 bfad76e 30 a324e78.pdf> accessed 26 February 2019.

with the implementation of the provisions on technology transfer.[68] The general essence of the technology transfer provisions is to foster the development of the needed technological capacity for climate change mitigation and adaptation in developing member states like Nigeria.[69]

During the third meeting of the conference of the member parties (COP) in Geneva, it was accepted that renewable electricity (including OGRE) is the first technological option for climate change mitigation.[70] It is already mentioned that OGRE is a preferred option for the mitigation of climate change in remote rural areas of Nigeria.[71] Regardless, there is a lack of technological capacity to innovate, manufacture and maintain it.[72] Thus, it is expected that the relevant provisions of the UNFCCC 1992 would yield the transfer of OGRE technological know-how that will foster the development of technological capacity in the sector. Regrettably, there is no single record of the transfer of OGRE know-how to Nigeria, under the auspices of the UNFCCC 1992. Dalindyebo writes that 'developing countries have argued that commitments on technology development and transfer have not been met.'[73] A report of the United Nations Environment Programme (UNEP)[74] and the International Centre for Trade (ICT) states that 'Climate-friendly technologies are only rarely being transferred to developing member states, and then primarily to a

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68 UNFCCC, 'Report of the Conference of the Parties on its sixteenth session, held in Cancun from 29 November to 10 December 2010'(UNFCCC/CP/2010/7/Add.1) Para 102. See also The Governing Instrument for the Green Climate Fund 2011 (adopted 11 December 2011 by Decision 3/CP17/2011/9/Add.1) Preamble. See also Wen-Chen Shih, 'The World Bank and Climate Change' (2000) Journal of International Economic Law 633, 640.

69 The UNFCCC 1992 (n 11) Art 4(5); The Kyoto Protocol 1997 (n 11) Art 10(c).

70 Ibid.

71 Section 2.

72 Ibid.

73 Dalindyebo Shabalala, 'Technology Transfer for Climate Change and Developing Country Viewpoints on Historical Responsibility and Common but Differentiated Responsibilities' in Joshua D Sarnoff (ed), *Research Handbook on Intellectual Property and Climate Change* (Elgar Pub 2016) 173.

74 The United Nations Environment Programme (UNEP) is the United Nations body that promotes environmental protection and sustainable development. See UNEP, *UNEP New Way Forward: Environmental Law and Sustainable Development* (UNEP 1995) VI.

small handful of emerging market economies.'[75] Regrettably, Nigeria is not among the beneficiaries of technology transfer of OGRE under the UNFCCC regime.[76]

The absence of clarity as to exact nature of the practical steps that developed countries should adopt to facilitate technology transfers is a factor that has limited the successful transfer of OGRE technologies to Nigeria. The UNFCCC provides that:

> Developed country parties …shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of… environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the convention[77]

The UNFCCC 1992 and the Kyoto Protocol 1997 have not defined the practical steps that will be taken to an extent sufficient to enable the implementation of this provision.[78] Dalindyebo writes that one of the causes of the perceived failure of industrialised countries is a lack of agreement on methodologies for actualising this provision.[79] The hallmark of this disagreement is the divergent views on the role of intellectual property as a barrier to the development and transfer of climate change-related technologies.[80] Consequently, no agreed

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75 Kaitlin Mara, 'New Climate Technologies Rarely Reaching Developing Member States, Panel Says' (2010) <www.ip-watch.org/2010/07/13/new-climate-technologies-rarely-reaching-developing-panel-says/> accessed 26 February 2019.

76 NOTAP, 'Technology Transfer' <www.notap.gov.ng> accessed 1 February 2019. For more details, SEE WIPO, 'Assisting SMEs to Make Effective Use of Patent Information: The NOTAP Case' <www.wipo.int/sme/en/best_practices/notap.htm> accessed 16 February 2019.

77 UNFCCC 1992 (n 11) Art 4(5).

78 Joshua Sarnoff, 'The Patent System and Climate Change' (2011) 16 Virginia Journal of Law and Technology 301.

79 Dalindyebo Shabalala, 'Technology Transfer for Climate Change and Developing Country Viewpoints on Historical Responsibility and Common but Differentiated Responsibilities' (n 73) 172.

80 In several meetings of the COP, developing member states have argued that Intellectual Property Rights (IPR) including patent impedes the transfer of climate friendly technologies to developing countries. Hence, a proposal was submitted in Cacun COP meeting for a removal of IPR protection for climate friendly technologies as the basis of a framework on technology transfer. This was rejected by developed member states on the argument that IPR remains an incentive for motivating private

framework contains a definition of the practical steps that would translate into the transfer of such ESTs.[81]

The Technology Mechanism is unable to help in adding clarity to the meaning of 'practical steps' as contained in the provision. The IPCC established that EST transfers involve different stages.[82] These are identification of needs; choice of technology; assessment of conditions of transfer; the agreement and implementation.[83] The CTCN is focused mainly on the first stage which is the identification of needs of developing countries.[84] It is not directly involved in the implementation of technology transfer or the formulation of an effective framework that defines the practical steps on technology transfer.[85] On the contrary, TEC is saddled with the responsibility of advising COP on the appropriate policies to adopt in furtherance of this provision.[86] However, it has prioritised technological needs assessments and understanding the barriers to technology transfer as its focal point for the present.[87] It has yet to give any recommendations to the COP on a workable definition of 'practical steps' on technology transfer for this provision.[88] Conick and Bhasin write in 2015 that it is too early to tell whether the

companies to innovate ESTs such as OGRE. See Carlos M Correa, 'Intellectual Property Rights under the UNFCCC: Without Response to Developing Countries Concern' in Joshua D Sarnoff (ed), *Research Handbook on Intellectual Property and Climate Change* (n 73) 74-91. See also Wei Zhuang, *Intellectual Property Rights and Climate Change: Interpreting the TRIPS Agreement for Environmentally Sound Technologies* (Cambridge University Law Press 2017) 39-44.

81 Brent Pinero, 'The Global Environmental Facility: A Dismal Failure' (Thursday, 3 October 2013) 787 Brief Analyses | Energy and Natural Resources, National Policy Analysis Centre.

82 Working Group III of the IPCC, *Climate Change 2007* (Cambridge University Press 2008) 158.

83 Ibid.

84 CTCN, 'Technical Assistance' (2018) <www.ctc-n.org/technical-assistance> accessed 6 February 2019.

85 Ibid.

86 UNFCCC, *'Technology Executive Committee'* <http://unfccc.int/ttclear/misc_ /StaticFiles/gnwoerk_static /TEM/26375b4c 4f504 62196df403498fcbdce/c4088971fd58499a926f4 1fb1c48fa30.pdf> accessed 15 February 2019.

87 Joshua Sarnoff, 'Intellectual Property and Climate Change with an Emphasis on Patents and Technology Transfer' in Cinnamon Carlarne and others (eds), *The Oxford Handbook of International Climate Change Law* (Oxford University Press 2016) 74-91.

88 Ibid.

TEC's effort will yield results in solving the problem.[89] Without disputing the above position, even if TEC were to come up with a framework on such practical steps, it would merely be advisory,[90] thus meaning that there is no guarantee that the COP would accept such recommendations.

Given the absence of a definition of 'practical steps' for such transfer, the successful cases of ESTs transfer, including OGRE, to developing countries, are mostly taking place in the global energy market. The transfer of OGRE technology to developing states that have taken place is driven by the search for profit within the global energy market. [91] The invention and manufacturing of RE technologies in developed countries are by private multinational and national companies.[92] These private investors are granted the exclusive right to control the use of such technologies.[93] They are motivated by profit to establish frontiers of business in other countries where there would be sufficient demand and adequate returns for their RE technologies, including OGRE. [94] Consequently, such investors are therefore exploring new market frontiers in developing countries with a good investment climate.[95] The term 'good investment climate' is defined as the interaction of factors including (a) the presence of domestic institutions and workforce; (b) a safe atmosphere for investment in terms of security of lives and property; (c) enabling infrastructures; (d) a stable legal framework.[96] The developing countries that have these attributes are

89 H C Connick and C Bhasin, 'Meaningful Technology Development and Transfer: A Necessary Condition for A Viable Climate Regime' in S Barrett (ed), *Towards a Workable and Effective Climate Regime* (CEPR Press 2015) 453.

90 Ibid.

91 Joshua Sarnoff, 'Intellectual Property and Climate Change with an Emphasis on Patents and Technology Transfer' in *The Oxford Handbook of International Climate Change Law* (n 87) 391.

92 Bernice Lee and others, *Who Owns Our Low Carbon Future? Intellectual Property and Energy Technologies* (Chantham House Pub 2009) 31-39.

93 The term patent has been defined by the World Intellectual Property Organisation (WIPO) as the right to decide who may or may not –use the patented invention for the period in which the invention is protected <www.wipo.int/> accessed 15 February 2019.

94 International Energy Agency, *Renewable Energy Medium Term Market Report 2015* (IEA 2015) 4-10.

95 Ibid.

96 Damilola Olawuyi, 'Beautifying Africa for the Clean Development Mechanism: Legal and Institutional Issues Considered', 24-25 www.nortonrosefulbright.com/knowledge/publications/115668/ accessed 13 February 2019.

mostly countries with economies in transition.[97] These countries include China, India, Brazil, and others.[98] It is reported by UNEP and the International Centre on Trade and Development (ICTD) that the major trends of renewable technologies transfer to developing member states were to those developing countries with a good investment climate.[99]

Nigeria has not been a beneficiary of such transfers of OGRE technologies in the international market given that it has an unattractive investment climate. A 2016 World Bank study of Nigeria's investment climate established that the 'business environment in Nigeria is less conducive than in any other comparator country...Overall, the business environment in Nigeria appears unattractive'.[100] A similar study on the attractiveness of developing countries for climate change-related investments establishes that even in Africa, Nigeria's investment climate is ranked among the poorest and categorised as very unattractive.[101] It is axiomatic that a stable and enabling legal framework spurs a good investment climate, even for OGRE.[102] The National Office for Technology Transfer Acquisition and Promotion Act (NOTAPA) 2004 is the principal legal framework for technology acquisition in Nigeria. Regrettably, the NOTAPA 2004 is not favourable for fostering a good investment climate through the transfer of ESTs including OGRE technologies to Nigeria. It is for this reason that Damilola remarks that "the NOTAPA Act...has continued to hinder the transfer of useful environmental technologies to Nigeria... it should be amended to make such transfers as straight as possible".[103]

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97 Martina Jung, 'Host Country Attractiveness for CDM Non-Sink Projects' (2006) 34 Energy Policy 2174.

98 Ibid.

99 UNEP and ICDST, *Patents and Clean Energy: Bridging the Gap between Evidence and Policy Final Report* (New York 2010) 31-33. See also Ana Peuyo, 'Technology Transfer: A Way Forward for Climate Change Negotiations '(2012) IDSS 2.0

100 World Bank, *An Assessment of the Investment Climate in Nigeria The Challenges of Nigeria's Private Sector* (World Bank 2016) 16.

101 Martin Jung (n 97) 2179, 2181.

102 World Bank, *The Investment Climate* (World Bank 2016) 1.

103 Damilola Olawuyi, 'Beautifying Africa for the Clean Development Mechanism: Legal and Institutional Issues Considered' in Benjamin J Richardson and others (eds), *Climate Law and Developing Countries: Legal and Policy Challenges for the World Economy* (Edward Elgar Publishing 2010) 279.

3.3 Conclusion

This section analysed the role of the UNFCCC 1992 regime in addressing the financial and capacity barriers to OGRE development in Nigeria. It was argued that the absence of a definition of 'practical steps' for the transfer of the needed technological know-how to developing countries like Nigeria is a barrier. Consequently, the UNFCCC 1992 has not resulted in tremendous success in addressing the capacity deficiency in the Nigerian OGRE sector.

4. The Paris Agreement 2015

4.1 Introduction

The Paris Climate International Agreement (the Paris Agreement) was concluded in the 21st COP meeting held in Paris in December 2015.[104] It entered into force on 4th November 2016[105] and is an amendment of the UNFCCC.[106] It has the objective of holding the global temperature below 2°C.[107] Consequently, it obliges member countries including Nigeria to formulate and communicate long term, low GHG emission development strategies[108] in the form of National Determined Contribution (later referred to as NDC) with the aim of achieving this objectives.[109] The Nigerian government has ratified the Paris Agreement[110] and has communicated its NDC pursuant to this provision.[111]

The Nigerian NDC defines the mitigation measures that will be taken to address climate change to include three actions. 'First,

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104 CCES, 'Outcomes of the UN Climate Conference in Paris: 21st Session of the Conference of the Parties to the UNFCCC' <www.c2es.org/international/negotiations/cop-19/summary> accessed 12 February 2019.

105 UNFCCC, 'Paris Agreement: Status of Ratification' (4 October 2016) < http://unfccc .int/pa ris_agreement/items/9444.php> accessed 10 February 2019.

106 The Paris Agreement 2015 (n 17) Art 21. See the UNFCCC 1992 (n 11) Art 15.

107 The Paris Agreement 2015 (n 17) Art 2(1) (a). See also Lavanya Rajamani, 'Ambition and Differentiation in the 2015 Paris Agreement: Interpretative Possibilities and Underlying Politics' (2016) 65 ICLQ 493, 496.

108 Ibid, Art 4(2) (3).

109 Ibid.

110 UNFCCC, 'Paris Agreement: Status of Ratification' (n 1386). See also 'Nigeria is set to implement the Paris Agreement with the Launch of Green Bonds'(January 17th 2017) Ventures Africa; Abuja .

111 UNFCCC, 'Nigeria NDC' (2015) <www.unfccc.int/submissions/NDC /Published %20Documents /Nigeria/1/Approved%20Nigeria's%20INDC _271115.pdf > accessed 23 February 2019.

reliable gas-powered generation, using associated gas currently flared, can replace small generators. Second, rural electrification will be driven by cost-efficient renewable solutions. Third, energy efficiency is greatly improved so as to reduce overall demand for energy and in doing so serve more people, faster'.[112] In relation to gas generation, it is proposed that efficient gas electricity technologies would save about 102 million tonnes of estimated GHGs emission in 2030.[113] In the same way, the government proposes to develop OGRE solar photovoltaic to the extent that it will save about 31 million tonnes of estimated GHGs emission by 2030.[114]

The Paris Agreement 2015 contains provisions on capacity building and technology transfer. These provisions would be examined in the light of whether it is a progression of the UNFCCC 1992 in addressing the capacity barrier to OGRE in Nigeria.

4.2 Technology Transfer and Capacity Building Provisions

The Paris Agreement recognises the role of ESTs in mitigating climate change, as such it provides that 'parties... shall strengthen cooperative action on technology development and transfer'.[115] It provides the basis for the future development of a technology framework for technology transfer.[116] It was stated that a barrier to the impact of the UNFCCC 1992 in addressing the capacity deficiency in the Nigerian OGRE sector is the absence of a framework or methodology for technology transfer. This provision for a technology framework is a progression given that it has the prospects of laying to rest this problem of absence of a framework or methodology for technology transfer.

However, the progression made by the Paris Agreement 2015 is whittled down greatly by the absence of an express obligation on developed member states to transfer such technologies. It was stated that the UNFCCC 1992 provides expressly for the obligation of developed member states to transfer ESTs to developing countries like Nigeria. However, the obligation has not crystallised into the transfer of the needed capacity to Nigeria. Regrettably, the Paris Agreement 2015 does not create an express obligation on developed member states or any developing member states to transfer ESTs including OGRE to developing member states like

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112 Ibid, 14.
113 Ibid, 3.
114 Ibid, 3.
115 The Paris Agreement (n 17), Art 10(2).
116 Ibid, Art 10(4).

Nigeria. The Agreement provides that 'Parties… shall strengthen cooperative action on technology development and transfer'.[117] Their obligation, just like other member parties is limited to cooperating with other member states to achieve technology development, transfer and support for developing member states to achieve this cooperation. A dimension of such obligation on member states to cooperate to develop and transfer ESTs is that it introduces competition.[118] Cedric writes that under such cooperative measures that countries 'are also interested in helping their own companies to take the lead in the international economic competition'.[119] Hence, such transfer of ESTs normally goes to developing countries with good investment climate where such companies would retain their competitive edge whilst making adequate returns for their investments.[120] Nigeria has a poor investment climate characterised among other things by the hostility of the NOTAP Act 2004 in enabling such transfer.[121] Hence, it cannot compete favourably with other developing countries with good investment climate to attract such technology transfer. In the absence of such express obligation on developing countries to transfer ESTs such as OGRE to developing member countries, there is no guarantee that Nigeria would benefit from such cooperative action.

Furthermore, the Paris Agreement 2015 provides that:

> Support, including financial support, shall be provided to developing country Parties for the implementation of this Article, including for strengthening cooperative action on technology development and transfer at different stages of the technology cycle…[122]

This provision has been interpreted to mean that the obligation is opened to developed and developing countries to voluntarily provide support for developing countries. The rationale for leaving this obligation open to developing countries as well is that patenting and development of ESTs is taking place in some developing

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117 Ibid, Art 10 (2).

118 Cédric Philibert, 'International Energy Technology Collaboration and Climate Change Mitigation' (2004) <www.oecd.org/env/cc/32138947.pdf > accessed 20 February 2019.

119 Ibid.

120 Ibid.

121 Martin Jung (n 97).

122 The Paris Agreement 2015 (n 17) Art 10(6).

countries like China, India, Philippine and Brazil .[123] Thus, they are in the position to provide support to other developing countries on technology transfer and development.[124] There is also an increased possibility that with this wider ambit of those under the obligation on technology transfer and development that OGRE and Know-how could be transferred to Nigeria. This may mean that the needed capacity to locally manufacture and maintain OGRE may be developed.

On one hand, the possibilities of this happening are limited by the absence of an express obligation on developed member states to transfer such technologies. The Paris Agreement 2015 does not create an express obligation on developed member states or any developing member states to transfer ESTs including OGRE to developing member states like Nigeria. The Agreement provides that 'Parties... shall strengthen cooperative action on technology development and transfer'. [125] Their obligation, just like other member parties is limited to cooperating with other member states to achieve technology development, transfer and support for developing member states to achieve this cooperation. A dimension of such obligation on member states to cooperate to develop and transfer ESTs is that it introduces competition.[126] Cedric writes that under such cooperative measures that countries 'are also interested in helping their own companies to take the lead in the international economic competition' [127] Hence, such transfer of ESTs normally goes to developing countries with good investment climate where such companies would retain their competitive edge whilst making adequate returns for their investments. [128] Nigeria has a poor investment climate characterised among other things by the hostility of the NOTAP Act 2004 in enabling such transfer.[129] Hence, it cannot compete favourably with other developing countries with good investment climate to attract such technology transfer. In the absence of such express obligation on developing countries to

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123 Helen De Conick and Amber Sugar, 'Technology Development and Transfer' in Daniel Klien and others (eds), *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford University 2017) 267.

124 The Paris Agreement 2015 (n 17).

125 Ibid, Art 10 (2).

126 Cédric Philibert, 'International Energy Technology Collaboration and Climate Change Mitigation' (2004) < http://www.oecd.org/env/cc /32138947.pdf > accessed 20 April 2018.

127 Ibid.

128 Ibid.

129 Martin Jung (n 97).

transfer ESTs such as OGRE to developing member countries, there is no guarantee that Nigeria would benefit from such cooperative action.[130]

Furthermore, the Paris Agreement provides that 'Developed country parties should enhance support for capacity-building actions in developing country Parties…'[131] The support is defined to be to the extent that should 'enhance the capacity and ability of developing country Parties… and should facilitate technology development… and deployment…relevant aspects of education, training and public awareness..'[132] It is very significant that unlike UNFCCC, the Paris Agreement 2015 made a separate provision for capacity building. Consequently, capacity building can still be enhanced in developing member countries like Nigeria outside the conundrum that is associated with technology transfer provisions. It is firmly expressed that such capacity building should be responsive to the national needs of individual developing member countries.[133] In addition, some author have expressed optimism that this provision would drive the development of endogenious capacity in renewable electricity technologies in developing member states like Nigeria.[134] On the strength of this provisions and existing commentaries on the Agreement, it can be garnered that this provision would certainly contribute to capacity building in OGRE in Nigeria, particularly the stipulated solar technologies in the Nigerian NDC.

Regardless, the absence of a clear goal on capacity building reduces the certainty as to the extent in which the Paris Agreement would help in addressing the capacity barrier in the OGRE sector. There is no clear goal on the extent that developed member states shall contribute to the development of ESTs such as OGRE in Nigeria through this support on capacity building. Commenting on this, Rajamani writes that

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130 Anna Huggins and Md Saiful Karim, 'Shifting Traction: Differential Treatment and Substantive and Procedural Regard in the International Climate Change Regime' (2016) 5(2) Transnational Environmental Law 427- 446

131 The Paris Agreement (n 17) Art 11 (3).

132 Ibid, Art 11(1).

133 Ibid, Art 11(2).

134 Susanne Droege and others, 'The Trade System and Climate Action: Ways Forward under the Paris Agreement', October 2016 <www.climate-diplomacy.org/publications/trade-system-and-climate-action-wa ys-forward-under-paris-agreement > accessed 2 February 2019.

> 'while mitigation and adaptation (albeit qualitative) goals have been identified in the Agreement, there are no clearly identifiable goals in relation to...capacity building. This introduces an element of uncertainty in the assessment of progress...'[135]

The implication is that while developed countries would certainly support capacity building for developing ESTs including OGRE in Nigeria. There is no obligation on them to provide the degree of support that would build the needed capacity to manufacture and maintain OGRE in Nigeria. Consequently, it is not certain that whatever support that would be provided by developed member states under this provision would contribute substantially to the removal of the capacity barrier that impedes the development of Nigerian OGRE.

4.3. Conclusion

This section considers the relevant provisions of the Paris Agreement 2015 and concludes that there are factors that will impede its contributions to addressing the capacity barrier to the development of OGRE in Nigeria. First, the possibilities of any transfer of OGRE technologies to Nigeria under the Paris Agreement 2015 is whittled down by the absence of an express obligation on developed and transitioning countries to transfer such technologies. There is a separate provision on capacity building which would certainly be impactful in the OGRE sector. However, the absence of a clear goal on this provision creates uncertainty on its specific impact in addressing the problem of capacity to manufacture and maintain OGRE in Nigeria.

5. Concluding Remarks

This chapter considers the place of the international climate change regime instruments in contributing to the removal of the identified capacity barriers to OGRE in Nigeria? The UNFCCC 1992 and the Kyoto Protocol 1997 were analysed. They contain obligations of developed member states to transfer ESTs and know-how (including OGRE) to developing countries like Nigeria. Thus, the obligations should ordinarily underpin the transfer of relevant technology and know-how that will help address the identified capacity problems in the Nigerian OGRE sector. A technology mechanism was created to modulate the implementation of this provisions.

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[135] Rajamani (n 107) 504.

Regardless of the relevant provisions, the UNFCCC 1992 and Kyoto Protocol 1997 have not resulted in the transfer of a single OGRE technology and know-how to Nigeria. It was argued that the absence of a definition of the practical steps for the transfer of the technological know-how results to a fall back to the global energy market for such transfer. The major drive for the patent holders of such technology to be willing to transfer is profit maximisation. Thus, the cases of transfer of OGRE technologies are to developing countries with good investment climate. Regrettably, Nigeria has not acquired any transfer of OGRE because it has poor investment climate in this context.

In the second part, the Paris Climate Change Agreement 2015 was analysed in the light of whether it is a progression of the UNFCCC 1992 in addressing the capacity barriers to the development of the Nigerian OGRE. The author bolsters confidence in the following changes made by the Paris Agreement 2015. It contains a separate provision on technology transfer and cooperation, which may result in the transfer of the needed capacity to Nigeria. There is also a provision for additional financial support for developing member states including Nigeria that will help them acquire the needed OGRE capacity pursuant to the provisions of the UNFCCC 1992. It creates an additional obligation on developed member states to enhance support on capacity building for developing member states including Nigeria.

Regardless, it is not certain that the Paris Agreement 2015 would contribute to the removal of the capacity barrier to OGRE. First, the possibilities of any transfer of OGRE technologies and know-how to Nigeria under the Paris Agreement 2015 is whittled down by the absence of an express obligation on developed and transitioning countries to transfer such technologies. There is a separate provision on capacity building, which would certainly be impactful in the OGRE sector. However, the absence of a clear goal on this impact creates uncertainty on the level of impact in addressing the capacity problem in the OGRE in Nigeria. There is no express provision on developed or transitioning countries to transfer OGRE technologies to Nigeria. As such, it is not certain that any transfer would ever occur especially with the bad investment climate in Nigeria.

To crown it all, the Paris Agreement is the beginning of a process. It is still probable that such contributions of developed states to the development of ESTs such as OGRE in Nigeria might be

strengthened subsequently by the decisions of the COP.[136] There is a possibility that the review might impact significantly in improving the effectiveness of the regime in relation to the financing of OGRE in Nigeria. In the absence of such a clear future in relation to this agreement, it is right to conclude that several factors are responsible for limiting the effectiveness of the international climate change regime in helping with the removal of the lack of capacity to innovate, manufacture and, maintain the development of OGRE in Nigeria.

[136] UNFCCC, 'Report of the Conference of the Parties on its twenty-second session, held in Marrakech from 7 to 18 November 2016' (2016) <http://unfccc.int/meetings/marrakech_nov_2016/meeting/9567.php> access sed 29 February 2019.