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TOWARDS A LEGAL FRAMEWORK FOR DEPLOYING CARBON TECHNOLOGIES TO ADDRESS THE ENVIRONMENTAL IMPACTS OF GAS FLARING IN NIGERIA

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ABSTRACT

In 2019, Nigeria contributed 7, 825 million cubic meters (mln m3/yr) to global greenhouse gas emissions. A legal framework has been developed to curb gas flaring and create the incentive to utilise flare gas, which is derived in part from existing legislation, and from market-based incentives. This developed a mechanism to convert waste gas into wealth while protecting health and the environment – a winning formula. Given that the objective of the framework is to guard against waste and protect the environment, it has wasted an opportunity to convert flare emissions into wealth by creating a framework for the deployment of carbon technologies to guard against the environmental impact of gas flaring. This is pertinent because as the industry transits to low carbon, and as oil exploration is expected to continue in the immediate future, critical stakeholders are now investing in carbon technologies. The legal framework mostly channels its technology-driven approach towards utilising flare gas. However, this article finds that the mechanism for converting flare gas to wealth in the legal framework presents an opportunity to harness the potential carbon technologies to develop mechanisms for capturing and utilising carbon from flare facilities, building other industry ecosystems, and developing other environmentally sustainable value chains. As Nigeria continues to explore its petroleum resources, a framework to encourage its deployment is missing. This article analysis carbon technologies highlighting how they are deployed to tackle emissions and utilise emitted carbon. It also reviews the legal framework for curbing gas flaring in Nigeria and proposes by way of recommendation a legal framework for the deployment of carbon technologies to curb the environmental impact of gas flaring in Nigeria that paves the way for incentivising and developing other environmentally sustainable industrial ecosystems that utilise captured emissions from flare sites.

Keywords: gas flaring, carbon technologies, carbon capture, investment, waste gas to wealth.

1. INTRODUCTION

Gas flaring and its associated impact on health, the environment, and the economy has been a cause for concern for governments across the globe.[1] This has led to several countries, oil companies, and international institutions to come together to find solutions and develop strategies to curb gas flaring or eliminate flaring in the industry by 2030. It led to the creation of the Global Gas flaring (GGFR) Partnership. The objective of the partnership is to increase the use of associated gas by removing technical and regulatory barriers, through research disseminating best practices, and by developing country-specific flare reduction programs. By doing so, the initiative aims to eliminate gas flaring completely by 2030. Also, part of the GGFR's strategy is ending poverty and boosting shared prosperity by looking to gas as a sustainable energy path and least cost source of flexible electricity supply that reduces fluctuation in demand and supply.[2] This initiative seems to be gaining support from industry players who are key stakeholders as the industry transitions to zero carbon. Exxon Mobil for instance announced that it will be investing the sum of $ 3 billion in Carbon Capture and Sequestration (CCS) over a 5-year period.[3] The company also estimates that the carbon capture market will reach $2 trillion by 2040. Furthermore, several oil companies have signed up for the initiative with some of them pledging to cut their emissions. The size of the investment that Exxon is willing to make in CCS is a possible indication of the viability of carbon capture and the role it will play in the oil industry's transition to zero emissions.

Nigeria is a signatory national government to the GGFR initiative, in addition to having ratified the Paris Climate Change

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1 Eman A. Emam, "GAS FLARING IN INDUSTRY: AN OVERVIEW" (2015) 57(5) Petroleum & Coal <https://www.vurup.sk/wp-content/uploads/dlm_uploads/2017/07/pc_5_2015_emam_381.pdf> accessed 30 April 2021

2 World Bank, 'Gas Reduction: Overview' <https://www.worldbank.org/en/topic/gas-flaring-reduction> accessed 30 April/2021.

3 Dan Eberhart,' Oil Giant Bets Big On Expected $2 Trillion Carbon Capture Market'(2021)<https://www.forbes.com/sites/daneberhart/2021/03/09/oil-giants-bet-big-on-expected-2-trillion-carbon-capture-market/> accessed 30 April/2021.

Agreement. Being part of these efforts towards converting flare gas waste to energy, and curtailing carbon emissions, Nigeria set a flare-out target of 2020 for itself.[4] Although that target has not been achieved, the country has put in place a legal framework for operationalising the GGFR initiative as part of its transition to a low carbon economy. Through the Nigerian Gas Flare Commercialisation Programme (NGFCP), it has also put in place a flare reduction program which is strategically designed to make associated gas commercially viable and capable of attracting investment. It is estimated that the NGFCP can save Nigeria $1 billion annually.[5] The strategy for commercialisation was developed with the view to eliminating gas flaring through technical and commercially sustainable projects. As part of this effort, Nigeria has also put in place a structure to develop its natural gas resources and increase domestic utilisation of natural gas. This was done by putting in place the policy, legal and regulatory framework for the development of natural gas resources. This includes developing natural gas infrastructure and gas markets and expanding gas infrastructure within the country.[6] Nigeria's gas policy framework also covers gas flaring for which the Flare Gas (Prevention of Waste and Pollution) Regulation, 2018 was made.[7]

The objectives of the Regulations are to "reduce the environmental and social impact of gas flaring; protect the environment; prevent waste of natural resources; and create social and economic benefits from gas flare capture".[8] Although these are the objectives behind the regulations, the content of the regulations is focused on prevention of waste of natural gas resources and how to make it economically viable to support commercialisation. There is nothing in the regulations that

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4 Department accessed 30 April 2021.

5 NGFCP, 'How Nigeria can save $1b yearly from flared gas' (2018) <https://ngfcp .dpr.gov.ng/news-and-events/posts/2018/april/how-nigeria-can-save-1b-yearly-fro m-flared-gas/> accessed 30 April 2021.

6 NIPC, 'National Gas Policy' (2017) <https://nipc.gov.ng/wp-content/uploads /2019/03/National-Gas-Policy-Approved-By-FEC-in-June2017min.pdf#viewer.ac tion=download> accessed 30 April 2021.

7 'Flare Gas (Prevention of Waste and Pollution) Regulation, 2018 < https://www.nu prc.gov.ng/wp-content/uploads/2020/06/Flare-Gas-Prevention-of-Waste-Pollutio n-Regulations-2018.pdf> accessed 30 April 2021.

8 Ibid

provide a framework for the reduction of the environmental impact of the carbon which is emitted into the atmospheric environment during the process of gas flaring. The Regulation also does not provide for the creation of social and economic benefits from the utilisation of carbon emitted in the process of gas flaring. Given that it is unlikely that Nigeria will stop oil exploration anytime soon, it is safe to assume that gas flaring will continue, especially when the Regulations provide that in certain circumstances, permits may be given to allow an oil company to flare gas. Nigeria is likely to continue its oil exploration for several reasons which include it finds itself in a continent with one of the largest number of person living in energy poverty, with many of those people living in Nigeria.[9] It also finds itself in a continent with the fastest-growing population in the world, many of whom are young people.[10]

While effort is being made to address energy poverty, Nigeria is also concerned about the social and environmental impact of gas flaring. Carbon capture provides ample opportunity for Nigeria to minimise its carbon footprint while protecting its citizens who have become vulnerable due to gas flaring. Another important reason why Nigeria may continue to flare in the immediate future is the fact that oil producers flare gas for technical, safety and cost-efficient reasons. Utilisation of associated gas can eliminate flaring for some of the gas which had previously been considered not cost-effective to keep. However, flaring may continue for technical or safety reasons, and for associated gas that may be in locations that are too remote from the necessary infrastructure that can transport them to a facility where they can be lifted.[11] Hence the urgent need to deploy carbon technologies to curb

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[9] Yinka Omorogbe & Ada Okoye Ordor, ENDING AFRICA'S ENERGGY DEFI CIT AND THE LAW: Achieving Sustainable Energy for all in Africa (Oxford University Press 2018).

[10] Omorogbe & Okoye-Ordor ibid; NJ Ayuk, 'African Countries Must Take a Balan ced Approach to the Energy Transition' Africanews (2012)<https://www.africa news.com/2020/12/07/african-countries-must-take-a-balanced-approach-to-the-energy-transition-by-nj-ayuk//> accessed 30 April 2021.

[11] Aare Afe Babalola & Damilola S. Olawuyi 'Overcoming Regulatory Failure in the Design and Implementation of Gas Flaring Policies: The Potential and Promise of an Energy Justice Approach' (2022) 14(11) Sustainability. https://doi.org/10.3390 /su 14116800 accessed 19 July 2022.

emissions, create economic value for carbon, and stimulate the utilise the captured CO_2.

This article analyses the legal framework for the reduction of emissions from gas flaring in Nigeria. It highlights some prospects and challenges associated with capturing and converting emitted carbon into feedstock for industrial use. It highlights some considerations for developing a framework for carbon capture and propose a legal framework for the capture and conversion of flare carbon into wealth. The article is divided into five sections with this section being the introduction. Section two discusses the role of carbon technologies in reducing emissions in gas flaring and promoting sustainable development. Section three does a gaps analysis of key shortcomings in the Nigerian laws that may prevent the development of carbon technologies. Section four makes recommendations, while section five is the conclusion.

2. THE ROLE OF CARBON TECHNOLOGIES IN REDUCING EMISSIONS FROM GAS FLARING AND PROMOTING SUSTAINABLE DEVELOPMENT

2.1 Nexus between carbon technologies and sustainable development

The role of carbon technologies in promoting sustainable development cannot be overemphasized. They can enable operators to monitor leaks, and capture and process carbon for further utilisation. Doing so can reduce the quantity or prevent the release of carbon into the atmosphere depending on the type and purpose of the deployed technology. The first step towards harnessing CO_2 is to have in place the technology that will allow for the detection, quantification, and monitoring of emissions. In this regard, remote sensing technologies have been developed to detect and quantify gas releases and fugitive emissions.[12] Studies

[12] Xavier Watremez, André Marblé, Thierry Baron, Xavier Marcarian, Dominique Dubucq, et al.. Remote Sensing Technologies for Detecting, Visualizing and Quan tifying Gas Leaks. SPE International Conference and Exhibition on Health, Safety, Security, Environment, and Social Responsibility 2018, Apr 2018, Abu Dhabi, United Arab Emirates< https://www.researchgate.net/publication/324382887_Re

have shown that these technologies can be applied to major, medium and small gas leaks for crisis management, safety monitoring and environmental monitoring respectively.[13] Some of the technologies that have been developed are designed to visualise and quantify leaks/emissions in real time.[14] In a departure from the available technologies that detect, a collaborative project by Total and ONERA entitled the New Advanced Observation Method Integration (NAOMI) Project, remote sensing technology was developed to detect and quantify leaks remotely.[15]

Deploying these technologies to stabilise greenhouse gases in the atmosphere will help realise some sustainable development goals (SDGs). These include Goal 7 on Energy, Goal 13 on Climate Change, Goal, and Goal 3 on Good health and Well-being.[16] For Nigeria, Goal 7,[17] will result in a sustainable and efficient transition to clean energy as it transitions to gas and renewable energy. On Goal 13,[18] It will help achieve the realisation of the zero-emission target,[19] and "prevent dangerous anthropogenic interference with the climate system".[20] In Canada for example, the deployment of CCSU technology at a Net-Zero hydrogen complex,[21] in Alberta is expected to sequester 2.76 million tons of carbon dioxide yearly.[22] Funding was also provided for oil sands

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mote_Sensing_Technologies_for_Detecting_Visualizing_and_Quantifying_Gas_Leaks> accessed 19 July 2022.

13 Ibid, p.1

14 Ibid p.2

15 Ibid p. 2

16 United Nations 'Do You Know All 17 SDGs?'<https://sdgs.un.org/goals> accessed 28 July 2022.

17 United Nations SDGs Goal 7:"Ensure access to affordable, reliable, sustainable, and modern energy for all' <https://sdgs.un.org/goals/goal7> accessed 28 July 2022.

18 United Nations SDGs Goal 13:' Take urgent action to combat climate change and its impacts' <https://sdgs.un.org/goals/goal13 > accessed 28 July 2022.

19 World Economic Forum, 'Strategic Intelligence, Green New Deals: Guiding Green-house Gas Removal' <https://intelligence.weforum.org/topics/a1G680000004C93E AE/key-issues/a1G680000004C9NEAU > accessed 28 July 2022/

20 United Nations SDGs, 'Atmosphere'< https://sdgs.un.org/topics/atmosphere > accessed 28 July 2022.

21 Nouman Mirza, David Kearns, 'Technical Report on State of the Art: CCS Technologies' (2022) <https://www.globalccsinstitute.com/wp-content/uploads/2022/05/ State-of-the-Art-CCS-Technologies-2022.pdf > accessed 28 July 2022

22 Hoicka, Christina, MacArthur, Julie & Das, Runa 'Canada's Green New Deal: Forging the socio-political foundations of climate resilient infrastructure?' (2020) Energy Research & Social Science <https://doi.org/10.1016/j.erss.2020.101442 > p.5

research and innovation.[23] Largescale deployment of the technology was done earlier in Texas, USA.[24] Benefits of this technology include value creation through multi-facility integration and monetisation of co-products among others. On Goal 3,[25] it will reduce the incidences of respiratory and other diseases associated with atmospheric pollution through gas flaring and other oil and gas-related emissions.[26] In this regard, technology can either reduce or remove emissions from the atmosphere, thereby reducing the incidences and occurrence of anthropogenic-related diseases.

As noted earlier, Nigeria has over the years developed policies and made laws and regulations to curb gas flaring which failed to regulate the activity given the quantum of emissions being recorded. Such failure has been attributed to a fundamental flaw in Nigeria's energy formulation which results in the enactment of laws and making of regulations that are not implementable, unenforceable, and incapable of addressing the socio-economic and environmental impact of gas flaring.[27] Lack of incentive, poor enforcement, and lack of gas infrastructure have further been identified as inhibiting factors.[28]

2.2Opportunity to Convert Emitted Carbon Waste into Wealth

Captured CO2 has various industrial uses and provides feedstock for making several products which create the perfect opportunity to convert CO2 emissions waste into wealth. Some of the products which can be made from captured CO2 include chemicals, plastics, carbon fibre, polyurethane foams, fuel production, concrete enrichment, and energy production.[29]

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[23] Ibid p.5

[24] Nouman Mirza note 21

[25] United Nations, SDGs Goal 3, 'Ensure healthy lives and promote well-being for all at all ages' <https://sdgs.un.org/goals/goal3 >accessed 28 July 2022.

[26] Predrag Petrović, Mikhail M. Lobanov 'The impact of R&D expenditures on CO2 emissions: Evidence from sixteen OECD countries' Journal of Cleaner Production, 248, 2020,119187, ISSN 0959-6526, https://doi.org/10.1016/j.jclepro.2019.119187 accessed 28 July 2022.

[27] Babalola & Olawuyi note 11

[28] Olujobi

[29] Krysta Biniek, Ryan Davies, & Kimberly Henderson 'Why Commercial Use could be theFuture of Carbon Capture' (2018) < https://www.mckinsey.com/business-

When applied to chemical making, CO2 is used as feedstock for industrial processes such as ethanol, syngas, and formic acid. For this purpose, carbon is converted into chemical intermediaries and the production of low carbon hydrogen.[30] In plastics making, adhesives and pharmaceuticals CO2 is transformed into polymers. In the petrochemical industry, it is used in the production of urea with around 125 Mt/ year of CO2 being utilised in its production in 2016, and polycarbonate polys. [31] In liquid fuel production, it can be used as synthetic fuel. It can be used to accelerate the growth of algae for use as feed stock for food, biofuels, and carbon fiber. It can also be used in the production of high-performance materials such as steel, concrete, graphene, and carbon composited.[32]

Industrial uses of CO2 create opportunity and potential for profitability in medium to long term. What this means for Nigeria is that with the right strategy and policy, the CCU technologies can be deployed in a profitable manner. Although the prospects of converting captured CO2 to wealth appears promising, the process of capture itself can be daunting in certain circumstances.[33] For instance, carbon capture from ground sources may pose more challenge than atmospheric carbon capture.

2.3 Challenges associated with capturing and converting emitted carbon

Several challenges to both the process of CO_2 capture and the deployment of the necessary technology to capture the emitted

functions/sustainability/our-insights/why-commercial-use-could-be-the-future-of-carbon-capture>. Accessed 30/April 2021.

[30] Biniek, Davies & Henderson ibid, IEA Energy "Technology Perspectives 2020: Special Report on Carbon Capture Utilisation and Storage CCUS in clean energy transitions" https://iea.blob.core.windows.net/assets/181b48b4-323f-454d-96fb-0bb 1889d96a9/CCUS_in_clean_energy_transitions.pdf accessed 30 April 2021.

[31] IEA 'About CCUS: Playing an important and diverse role in meeting global energy and climate goals'< https://www.iea.org/reports/about-ccus> accessed 30 April 2021.

[32] David Roberts 'These uses of CO2 could cut emissions and make trillions of dollars' (2019), <https://www.vox.com/energy-and-environment/2019/11/13/20839531/climate-change-industry-co2-carbon-capture-utilization-storage-ccu> accessed 30 April /2021.

[33] Galadima A. & Garba Z. N. 'Carbon capture and storage (ccs) in Nigeria: fundamental science and potential implementation risks' (2008) 3(2) < https://www.Ajol.info/index.php/swj/article/view/51802> accessed 30 April 2021., Anastasia M., Omega Fredrick & Malcom W. 'The Future of Carbon Capture and Storage in Nigeria' (2009) 4 SCIENCE WORLD JOURNAL 1597< https://www.ajol.info/index.php /swj/article/view/51848> accessed 30 April 2021.

gas. While much of the literature on CCUS deal with carbon captured from gas or oil power plants i.e. flue gas, the focus of this paper is on capture of carbon from oil production facilities during in the course of gas flaring.[34] Some of the challenges associated with carbon capture include the energy-intensive nature of converting captured carbon to industrial feedstock such as the conversion of hydrogen to make synthetic hydrocarbon fuel.[35] Deploying such technology on a larger scale for commercial use may not be cost effective for some industry uses. This may also make the industries to rely more on oil as feedstock because oil may be a cheaper source of feed stock than those derived from captured carbon. A strategic approach may be required to make its deployment feasible. Capture and processing at flaring facilities may be less energy and cost intensive. It may however present different sets of challenges that will require careful consideration and strategic approach to deployment of technology. In this regard, Nigeria may also need to concentrate on determining the kind of technology to deploy and on developing the necessary skills to apply to running and maintaining these technologies.[36] Many of the technologies that convert CO_2 to industrial feedstock are in early stages of development. This may require extra effort to fast-track deployment on a large scale.

3. THE LEGAL FRAMEWORK AND GAPS ANALYSIS OF KEY SHORTCOMINGS IN NIGERIAN LAWS THAT MAY PREVENT THE DEPLOYMENT OF CARBON TECHNOLOGIES

3.1 The legal framework for the reduction of emissions from gas flaring in Nigeria:

a. The Climate Change Act 2021

It provides a legal framework that will help Nigeria achieve low

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[34] See IEA 'About CCUS: Playing an important and diverse role in meeting global energy and climate goals'

[35] IEA, Special Report on Carbon Capture Utilisation and Storage: CCUS in Clean Energy Transitions 2020, < https://iea.blob.core.windows.net/assets/181b48b4-323f-454d 96fb0bb1889d96a9/CCUS_in_clean_energy_transitions.pdf>., Krysta Biniek, et al., Why Commercial Use could be the Future of Carbon Capture, 2018< https://www.mckinsey.com/business-functions/sustainability/our-insights/why-commercial-use-could-be-the-future-of-carbon-capture>

[36] IEA, CCUS in Clean Energy Transitions 2020 note 30

GHG, inclusive growth and sustainable development by among others, mainstreaming climate change actions in line with national development priorities, facilitating the coordination of climate change action for achieving long-term climate objectives, ensure the integration of climate change policies and actions into other related policies for promoting socio-economic development and environmental integrity.[37] These objectives will be realised by implementing a National Climate Change Action Plan as set out in section 20 that will contain proposed sectoral mitigation and adaptation actions and proposed incentives that will help achieve GHG reduction for both public and private sectors. Section 22 imposes obligations on MDAs to create a climate change desk that will be responsible for integrating climate change activities into their core mandates, planning and budgeting for climate change programs, projects, and activities, and ensuring compliance with emissions reduction targets. Adapting these to the oil and gas sector involves sectoral instruments that are designed to reduce flaring and encourage the utilisation of flare gas and possibly emitted carbon.

b. The Petroleum Industry Act 2021

Section 4 of the Act established the Upstream Petroleum Regulatory Commission. Section 6 provides the objectives of the Commission to include the regulation of upstream operations, ensure compliance with laws and regulations, promote sustainable, healthy, safe, and effective petroleum operations, implement government policies in accordance with the Act, promote transparency, accountability, etc, and create enabling business environment for petroleum operations and importantly, ensure strict compliance with environmental legal instruments relating to upstream operations. While section 7 empowers the Commission to implement and ensure compliance with legal instruments that ensure technical compliance in petroleum operations, set and enforce standards and regulations for petroleum operations facilities including those related to eliminating gas flaring and venting, maintain an industry databank, preserve records and data from upstream operations, subject to confidentiality, share data and information with other government entity whose functions relate to the industry. Section 25 requires any Ministry,

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[37] S.1(d) and (e) Climate Change Act 2021.

Department, or Agency (MDA) whose exercise of its functions will impact upstream operations to consult with the Commission prior to taking any steps. Section 26 vests special powers on the Commission to investigate illegal upstream petroleum operations, conduct surveillance of installations and vessels, enter upstream facilities in exercising these powers, and seal or close premises or facility that is in breach of the Act. Section 27 creates a special investigative unit that is vested with the special powers provided in section 26.

Section 167 provides for natural gas prices for strategic sectors and distributors apply price control for certain classes of domestic wholesale gas customers. It also provides separate pricing regimes for the power sector and other commercial sectors, while section 168 provides the pricing mechanism for gas-based industries. Part VII sets out common provisions that apply across the industry value chain, including those on consultations with stakeholders before making regulations or amendments to same, and procedure for addressing contraventions and enforcement of licence conditions. Chapter 4 covers fiscal framework- in terms of fiscal incentive, section 260 exempts associated natural gas from hydrocarbon tax. Section 264 disallows deductions for expenditure incurred as penalty for gas flaring or imposition related to same. Section 104 (1) prohibits the venting of gas except in an emergency, by exemption or as acceptable safety practice. Doing so constitutes an offence that attracts a fine that is not tax deductible and not eligible for cost recovery. By virtue of section 105, penalties incurred through flaring shall be prescribed by the Flare Gas Regulations. The section also gives the Commission right to take natural gas at the flare stack that is meant for flaring free of charge. S.106 requires licensees to install prescribed metering equipment in every flare or venting facility. Failure to install such equipment amounts to an offence liable to a fine prescribed by regulation. Section 107 empowers the Commission or Midstream Authority to grant permit to allow flaring or venting for facility start-up or strategic operations such as testing. Section 108 requires licensees to submit a natural gas flare elimination and monetisation plan as prescribed under the Act.

c. The Flare Gas (Prevention of Waste and Pollution) Regulations, 2018

They are made pursuant to Section 9 of the Petroleum Act, Section 5 of the Associated Gas Reinjected Act as well as all other

enabling powers of the President, including section 315 of the 1999 Constitution. It emphasised the rights of the Federal Government to take flare gas free of cost without paying royalty (2) (1). The Minister may issue permits to grant access to the flare gas in any site on behalf of the government. Producers may also apply to use flare gas for commercialisation subject to some exceptions (3) (1 – (4)). Access to flare data is only given subject to permit which may be revoked for reasons set out in S. 7. Part III S. 13 – 15 – payment for flaring gas which specifies the amount of money to pay for flare from specified barrels of oil per day. An obligation is also placed on producers to report gas flare data; failure to prepare, maintain and submit logs; to install and maintain metering equipment; and to supply accurate and complete data and log or record may result in the revocation of permit Part IV S.16 – 22.

S.12 prohibits against flaring and venting of gas by producers except pursuant to a certificate in line with the Associated Gas Re-Injection Act. S. 3(2) of the said Act provides that such certificate will be issued where the utilisation or re – injection of the associated gas is not appropriate or feasible in a particular field. The provision also prohibits permit holders from routine flaring and venting and prohibits producers from routine flaring and venting from Greenfield projects. This appears to suggest that producers may, in certain circumstances flare gas form non – Greenfield facilities. S. 13 which deals with payment for gas flare appears to support this as it is indicated therein that the payment is applicable to routing or non–routine flaring except for those flares associated with an act of war, community disturbance, insurrection, storm, flood, earthquake, or other natural phenomena that are beyond the control of producers. This goes to support the assumption that regardless of the NGCP, it is expected that gas will continue to be flared in Nigeria for technical and other efficiency reasons.

d. National Data Repository Regulations 2020

Establishes a repository at the Department of Petroleum Resources (now Upstream Petroleum Regulatory Commission) for timely and holistic oil and gas data, storage, management, and preservation same. Regulation 2 further provides that the repository shall be a digital platform that will allow for effective interaction among agencies and between them and the industry, provide adequate monitoring and regulatory tools, provide

geographic information management system and satellite information processing capabilities for monitoring facilities and operations, support the use of predictive analytics, artificial intelligence (AI), and promote research and development (R&D). Regulation 7 requires all licence holders and field operators to submit prescribed data in specified formats to the repository, they will also be required to register on to a Value Monitoring Digital Platform where they will be required to submit the prescribed data. It also itemised the data which the licensees and operators are expected to provide. Failure to comply with the regulations attracts sanctions and penalties which include refusal of statutory and regulatory approvals, exclusion from repository services, civil action for recovery of unpaid fees and interest, and others stipulated in the second schedule of the regulations.

3.2Gaps analysis of the legal framework for the reduction of emissions from gas flaring in Nigeria

Studies indicate that several factors hinder the legal and regulatory framework for curbing emissions from gas flaring in Nigeria. They include the absence of incentives that will stimulate investment in gas utilisation or re-injection facilities by oil companies,[38] a weak enforcement regime characterised by the absence of deterrent sanctions which is demonstrated by the weak implementation of the Petroleum Act 1969 and the Gas Re-Injection Act 1979 that required companies to provide reinjection gas plans,[39] lack of infrastructure to commercialise flare gas,[40] lack of modern gas utilisation enabling technologies which is attributable to lack of finance,[41] and underdeveloped gas market.[42] From an energy justice perspective, it has been observed that poor

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[38] Uchenna Jerome Orji 'Moving from gas flaring to gas conservation and utilisation in Nigeria' (2014) OPEC Energy Review, 38: 149-183. <https://doi.org/10.1111 /opec. 12019 > accessed 16 August 2022.

[39] Olusola Joshua Olujobi & Temilola Olusola Olujobi 'Comparative appraisals of legal and institutional framework governing gas flaring in Nigeria's upstream petro leum sector: How satisfactory?' (2020) Environ Qual Manage 1– 14< https://doi. org/10.1002/tqem.21680 > accessed 16 August 2022. Uchenna Jerome Orji note 38

[40] Olujobi & Oujobi note 39, ibid

[41] Olujobi p.2-3

[42] See. S. 8-9 Climate Change Act 2021.

implementation regulatory failures inhibit the effective implementation of gas flaring policies in Nigeria.[43]

A review of the framework for reducing emissions from gas flaring indicates a data-driven approach to flare reduction. At the core of this approach is the critical role that technology will play in collecting the data, developing incentives for utilisation, implementing legal instruments, monitoring compliance, and enforcing the laws. The review further indicates that the legal framework is heavily skewed towards the utilisation of flare gas, with no attention being paid to incentivising the capture and utilisation of carbon from flare facilities. Nevertheless, for the framework to ensure sustainable reduction of emissions from gas flaring, the applicable rules must be clear, transparent, and accessible to all stakeholders, and the incentive mechanism should also be clear and capable of strategically attracting the necessary investment. This could be contextualised as follows:

a. Clarity of the legal instruments

The laws must clearly spell out obligations, compliance rules and procedures, and sanctions for non-compliance. The Climate Change Act has clearly bestowed data collection and reporting obligations on the various sectors of the economy. It also empowers the Secretariat of the National Council on Climate Change to, among other things, serve MDAs and other stakeholders with compliance guidelines that are prepared by the Council, and monitor compliance by visiting facilities to verify compliance with data collection and reporting. Transparent access to real-time data is critical for decision-making for both public and private sector stakeholders. The Federal Ministry of Environment is responsible for managing Nigeria's GHG inventory process and ensuring compliance with the country's obligations under the United Nations Framework Convention on Climate Change (UNFCC). A review of the website does not indicate a published copy of the compliance guidelines as indicated in section 8 of the Climate Change Act 2021. While the section provides that the Secretariat will prepare and serve the guidelines on MDAs, public and private entities, providing virtual

[43] Babalola & Olawuyi note 11 – policies was used in this study to generically describe legal instruments, including laws, policies, regulations, guidelines, etc

access to it and other legal and procedural documents will enhance compliance. Using the word serve in the section creates room for abuse as some can attribute their non-compliance to not being formally served a copy of the guidelines. Providing virtual access and directing stakeholders to them can help check the abuse.

The Act clearly sets out obligations and section 22 establishes liability for non-compliance. The provision does not however clearly spell out the kind of sanction that will be given or the fine that will be imposed. This suggests a form of discretionary sanctioning regime that signals a weak sanctioning mechanism which could result in regulatory failure.[44]

The licensing provisions on exemption from the prohibition on flaring or venting provided in section 107 provide the circumstances where an exemption will be made by considering the surrounding circumstances of each request. Nothing is mentioned therein on the awarding procedure, which creates uncertainty and makes the process discretionary.[45]

It has been observed that one of the causes of regulatory failure in Nigeria is the non-stringent fines for violation and non-compliance with legal requirements which are not commensurate with the harm caused by flaring.[46] For instance, section 5 of the Gas Flare Regulation imposes a fine of ₦50,000.000 or imprisonment for not more than 6 months or both for providing inaccurate or incomplete gas flare data. This may be inadequate given the human and environmental impact of flaring and venting. Section 7 of the National Data Repository Regulations requires all licensees, lessees, and operators to submit specified records and data to the national repository established under this regulation. Non - compliance is said to attract refusal of statutory approvals, impositions of sanctions and penalties, exclusion from services, and civil actions for recovery of fee. The second schedule of the regulations clearly outlined the violations and prescribed penalties. Whether some of the penalties are sufficient could be determined using international best practice among others. In terms of deploying carbon technologies, the legal framework has clearly provided incentives to utilise flare gas. What is missing is the incentive to capture and utilise the emitted carbon.

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44 Babalola & Olawuyi note 11

45 Ibid

46 Ibid

b. Access to data on gas flaring and venting

Both the Climate Change Act and the Petroleum Industry Act require the creation of data repositories for the oil and gas sector. Although a review of its National Determined Contributions (NDC) indicates that there are 28 adaptation and mitigation projects in the oil and gas sector, it does not provide data on the sector's emissions reduction contribution to the national target. The website however provides a downloadable GHG inventory report. Lack of real-time data will no doubt impact the ability of the Council to visit, monitor and verify data promptly and effectively. the UPRC website on the other hand does not contain a database on flare emissions. Lack of transparent and verifiable data has been identified a huge cause for concern for flare emissions reduction, commercialisation standards and penalties.[47] Of importance to this article is its implication for the deployment of emissions-reducing technologies in the industry. For instance, studies have shown that flaring intensity has increased in Nigeria.[48] The increase is attributed to smaller and unrelated fields located in areas that make gas utilisation difficult.[49] In this regard, it has been observed that around 81% of this occurs in fields operated under Service Contract, Sole Risk/ Independent, and marginal fields.[50] Being small operators makes it difficult for them to cope with the investment cost of collecting and utilising associated gas.[51] The need to deploy technology to gather flare data from these remote locations, analyse them, and better deploy technology for flare detection and obtain sufficient data to help develop a strategy to deploy infrastructure is clear. Remote sensing technologies can held quantify emissions from such sites

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47 Ibid

48 World Bank, '2022 Global Gas Flaring Tracker Report' https://thedocs.worldbank.org/en/doc/1692f2ba2bd6408db82db9eb3894a789-0400072022/original/2022-Global-Gas-Flaring-Tracker-Report.pdf, accessed 21 October 2022.

49 Ibid

50 Yobo Moses Tambari, Sornaate Lucky Easy2 & Akpan Paul Paulinus 'Flare Gas Gathering and Utilization: A Strategic Approach to Greenhouse Gas Emission Reduction in Nigeria' (2016) International Journal of Environmental Protection and Policy 4(1), 10-15 < https://pdfs.semanticscholar.org /1e4c/72a73efb3afa0f7320bb7cf30c056b2de414.pdf> accessed 16 September 2022.

51 Ibid

and help determine the technology to use, and how to capture, store, transport, or utilise emitted carbon from the flare.

3.3 Incentive to attract investment into gas flaring emission reduction projects:

While a review of the framework for the reduction of gas flaring in Nigeria indicates some lapses that could result in regulatory failure if not addressed, it also presents an opportunity to deploy technology to tackle the environmental, human, and social impact of gas flaring especially as they persist in remote locations. Being the vehicle to incentivise the commercialisation of flare gas, the Gas flare Regulations pursuant to which the Flare Gas Commercialisation Program was developed could incentivise the deployment of carbon technologies and the development of markets for carbon utilisation through the technology-driven approach to national emissions reduction given that such market is currently non – existent in Nigeria.

4. RECOMMENDATIONS

4.1 Proposed Legal Framework for the Capture and Conversion of Flare Carbon into Wealth using the technology-driven approach the Climate Change Approach

Section 1(1) of the Climate Change Act provides one of its objectives as implementing mitigation measures that promote low carbon economy and sustainable livelihood. Section 26 provides for climate change education and allows the Secretariat to support scientific research and other similar projects that are relevant to the formulation and development of educational curricula and programmes geared towards adaptation and risk mitigation. Section 6 of the Petroleum Act provides the objectives of the UPRC to include that it shall ensure that upstream operations carry on in a way that minimises waste and achieve optimal government revenue, promote an enabling environment for investment in upstream petroleum operations. Section 10 provides the powers of the UPRC to include setting standards to promote the adoption of new technologies for upstream petroleum operations. Section 31 provides the objectives of the mid and downstream authority to include ensure efficient, safe, effective and sustainable infrastructural development of midstream and downstream petroleum operations, promote the supply and distribution of natural gas and petroleum products in midstream

and downstream petroleum operations and the security of natural gas supply for the domestic gas market, promote, establish and develop positive environment for international and domestic investment in midstream and downstream petroleum operations, and promote policies and objective as are consistent with the provisions of the Act. The function of the Authority includes ensuring security of supply, development of markets and competition in the markets for natural gas and petroleum products, promote the principles of economic development of infrastructure for midstream and downstream petroleum operations. Section 52 of the act seeks to establish an infrastructure fund through which the government will participate in midstream and downstream infrastructure operations, increase domestic gas consumption through projects partly financed by private investments, encourage private investment through risk sharing in selected projects, and reduce or eliminate gas flare.

As discussed in the preceding section, technology is expected to play a crucial role in realising Nigeria's GHG ambitious target. Furthermore, the Gas Flare Regulation also seeks to create social and economic benefit from gas flare capture and prevent the waste of natural resources. In furtherance of this, by virtue of section 3(2) a producer may be permitted to utilise flare gas for commercialisation. The above-analysed instruments, objectives of the flare regulation, and its incentive to producers to commercialise flare gas paves the way for developing incentives that can attract investment into technologies that detect and quantify emission leaks and report same in real-time, and those that can harness and utilise same as demonstrated by the NAOMI and the Canadian Alberta Net – Zero Complex projects respectively. The provisions of the Climate Change Act, Petroleum Industry Act, and the Flare Regulation such as those mentioned in this section create the enabling regime to support the establishment of a legal framework that can support the deployment of technology to reduce flare emissions by converting the captured carbon at the flare sites into wealth such as feedstock and raw material for industrial use as envisaged by section one of the Flare Gas Regulations and the Petroleum Act by creating a new market for captured carbon.

To develop the legal framework, in the short and medium term, regulations similar to the existing Flare Gas Regulations 2018 should be made pursuant to the Climate Change Act and

Petroleum Law to implement the carbon capture technologies deployment policy. The regulation should include provisions on the following.

a. Research, Development, and Innovation

This provision should provide incentives to engage in R&D for the development of efficient and scalable carbon capture technologies. Incentives in this regard should include making research grants available for tertiary institutions to develop carbon technologies, and endowments to tertiary institutions to support and encourage carbon technologies research. The Clean Development Mechanism (CDM) can also be explored by the regulations to attract investment in carbon technologies innovation. Some form of financial and fiscal incentives should be included in the regulations for carbon technologies that were developed through the R&D/innovation grants and endowments. This will make the needed technology available for deployment increase knowledge, skills, and capacity on carbon capture technologies. As mentioned earlier in this section, section 26 of the Climate Change Act allows the Secretariat to support climate change scientific research and projects that support adaptation and risk mitigation; while Section 6 of the Petroleum Act seeks to minimise waste, achieve optimal government revenue, and promote an enabling environment for investment in upstream petroleum operations. Section 10 empowers the UPRC to promote the adoption of new technologies for upstream petroleum operations. This can help guide the provisions on R&D in the proposed framework.

b. Skills and Capacity Development

The regulation should create incentives for producers to engage in skills development to sustain the long-term deployment of carbon capture technologies. This is because one the of challenges Nigeria has faced for long is lack of human capacity and skills. This is one of the reasons behind the Nigerian Oil and Gas Industry Content Development (Local Content Act) 2010. The Act was enacted to increase participation of indigenous persons in the industry. This participation also involves capacity building and skills development will enable Nigerians to participate in the industry by providing services or through investments. Collaboration with private sector investors across the carbon capture value chain should also be incentivised to develop skills and enhance carbon capture and processing skills. The regulation should also consider

encouraging skills transfer by identifying and promoting the transferable skills which it seeks to apply to the deployment of carbon technologies. An example is digital skills and information technology where skills in blockchain technologies may be relevant to the deployment of carbon technologies. The Climate Change Act and the Petroleum Industry Act all support capacity building through various educational and collaborative support and investments. This can assist in developing the proposed skill development provisions of the suggested framework.

c. Market Creation

The regulation should create a market for captured carbon where such markets do not exist, for instance, carbon building materials. Where a market already exists for the captured CO2 such as fertiliser production, the regulation should increase market access for carbon technologies. In creating the markets, the regulation should take into consideration the various industrial application of CO2 and the various value chains it seeks to develop. This includes markets for processing CO2 where it may not be feasible to process it during capture. Section 3(2) of the Gas Flare Regulation provides the opportunity for flare producers to take the lead in creating such markets through the commercialisation of captured carbon especially since the Petroleum Act enables them to participate in upstream, midstream, and downstream operations. The proposed regulation should replicate section 3(2) of the flare regulation and clearly provide the rules and procedures for each segment of the proposed value chain.

d. Market Access

The regulation should create market access for captured carbon through entry and exit requirements. It should also provide entry and exit requirements for dedicated infrastructure such as pipelines. In this regard, its priority is the creation a of level playing field for market participants, and ease of entry and exist to participants. In this regard, the framework should provide such access by adapting the access provisions of the Petroleum Industry Act taking into consideration the technical characteristics of CCU and other carbon technologies.

e. Infrastructure Development:

The regulation should provide equal access to infrastructure to enable producers deliver CO2 to their customers, or to process their CO2 to produce feedstock and deliver same to industry

users. The regulation should consider creating incentive to recycle existing pipelines. The Nigeria Gas Transportation Network Code which is a contractual framework for domestic gas delivery can be leveraged on to support the delivery of CO2 or CO2-processed feedstock to industry users. This will reduce the cost of providing infrastructure and create room to provide other suitable infrastructure subsequently.[52] By recycling oil pipeline for CO2 transportation use, in this initial stage, infrastructure will be provided for a fraction of the cost of building new infrastructure. It will also facilitate deployment by avoiding the challenges that are associated with building new infrastructure. Therefore, recycling can save time and cost of deploying carbon capture technologies. The Petroleum industry Act provides ample guide in that direction.

In the long term, a legislation could be enacted by the parliament to eliminate carbon emissions, deploy carbon technologies and utilised captured CO2 emissions. In drafting the legislation, key considerations identified in (3.0) and the proposals in this section should be considered to ensure carbon technologies are deployed, infrastructure is put in place and the carbon value chain is developed in a sustainable manner. A dedicated regulator should be created and vested with the powers to facilitate the deployment of carbon technology and monitoring of the level of reduction in carbon emissions as a result of the deployment. This will provide valuable data that will determine subsequent carbon-related value creation. The legislations should be holistic in addressing the waste, environmental, social, economic, and developmental aspects of deploying carbon technologies to reduce CO2 emission. Most importantly, it should provide clear obligations and stringent penalties and sanctions to deter violations. In 2020, A Bill for and Act to Prohibit Flaring of Natural Gas in Nigeria and for matters Connected Therewith was presented before the National Assembly.[53]The Bill also allows for flaring on technical and economic grounds.[54]It also provides opportunity for utilisation of

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[52] Upstream Petroleum Regulatory Commission 'Nigeria Gas Transportation Net work Code (NGTNC)' https://www.nuprc.gov.ng/nigerian-gas-transportation-network-code-ngtnc accessed 28 August 2022.

[53] A Bill for an Act to Prohibit Flaring of Natural Gas in Nigeria and for matters Connected Therewith. Senate. (2020).

[54] Ibid Section 4.

associated gas either for re- injection or industries use.[55] Like the gas flaring Bill, a similar Bill which specifically seeks to target emissions from gas flaring in oil production should be drafted and presented to the National Assembly for passage. The Bill should seek to prevent waste, protect the environment, create wealth, and value Chain that will expand the utilisation of captured carbon in carbon industries ad created new ones. It should also seek to ensure data generation, preservation, and monitoring to enable decision-makers to make informed decisions about carbon technologies in the future. Doing so will ensure that gas flaring will be eliminated, and carbon emissions will be reduced. It is recommended that the format adopted by the Petroleum Industry Act should be adopted to clearly separate upstream, midstream, and downstream activities, institutional framework and governing rules and procedure for the carbon value chain development. Most importantly, the Bill should clearly provide obligations, sanctions, and fines to ensure effective implementation and enforcement. the If both are done soon, Nigeria might well be on its way to meeting or beating the emissions target it set for itself.

5 CONCLUSION

Nigeria was estimated to have lost an estimated ₦ 233 billion (US$ 761 million) to gas flaring in 2018 which translates to 3.8% of the global total costs for that year.[56] The environmental cost was also estimated to cost ₦28.8 billion (US$94 million) annually. The good news is that gas flaring and its environmental impact can be curtailed. This requires strategic action and commitment by governments. Governments, international organisations, and the oil industry players have indicated willingness and commitment to eliminate gas flaring. Nigeria has taken steps to reduce or possibly eliminate gas flaring by 2030. The National Gas Policy ensured a foundation was built for the expansion and development of Nigeria's domestic gas market. It also supported the Flare Gas Regulations 2018 and the NGFCP. While the Regulations and the NGFCP create a framework for curbing gas flaring, another key

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[55] Ibid Section 8.

[56] PWC, Assessing the Impact of Gas Flaring on the Nigerian Economy <https: //www.pwc.com/ng/en/assets/pdf/gas-flaring-impact1.pdf.> accessed 30 April 2021.

area of impact of gas flaring which is the environment has not been covered. Nigeria can only reduce its carbon emissions effectively if gas flaring and the carbon it emits are curtailed together. This approach will ensure that Nigeria has an effective and sustainable approach to CO2 emissions reduction. This article has identified the gap in Nigeria's strategy to reduce CO2 emissions. It has also identified some key considerations that will enable Nigeria to develop a framework for the deployment of carbon technologies with the view to reducing carbon emissions, protecting the environment while creating economic value and wealth from the carbon emissions waste. The framework for deploying carbon technologies to reduce the impact of CO2 emission which occur during gas flaring is also crucial to helping Nigeria fulfil its commitment to attaining zero emissions by 2030 as it continues its transition to a low carbon economy.