



TOWARDS A LEGAL REGIME FOR HEALTH AND SAFETY IN ENERGY TRANSITION

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This article discusses the need to promote health and safety in the energy sector in the era of energy transition. It accounts for health and safety concerns in the energy sector. It argues that the energy transition brings with it a new dimension to health and safety that is distinct from what has been experienced in fossil fuels and nuclear energy generation. The implications are that new liabilities are arising from these technologies, raising fresh health and safety considerations distinct from the traditional energy sector. It calls for the development of a new regime for health and safety that puts standards for energy transition technologies in place, a liability regime, and compliance mechanisms through regulators. Energy transition therefore should account for the development of a viable regime that accommodates the peculiarities of safety issues in sustainable energy deployment.

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1. INTRODUCTION

Climate change concerns and the attendant consequences that are associated with conventional energy sources has made the call for the transition into alternative energy sources to become more prominent.¹ The role of the international climate change regime under the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement has gained momentum on the need to reduce the impact of climate change² with increase in much considerations for clean energy technologies.³ Energy transition is a critical issue in both domestic and international energy market and entails the move towards energy production and utilisation pathways that place premium on clean and sustainable energy⁴ such as geothermal, solar, wind and hydropower energy as against the utilisation of coal, oil and gas sources. The call for energy transition therefore is not only limited to the deployment of clean energy sources but should entail the consequences of their implementation as seen in the issues surrounding health and safety.

The objectives underlying this article are to give an analysis of the questions relating to health and safety issues that are associated with the transition to sustainable energy from fossil fuel sources. It gives a discussion of the health and safety issues that are connected to the global energy transition shifts, taking a reflection on the implications for the overall governance of the energy sector. It examines the health and safety risks in the traditional energy sector and reviews the extent of adaptation or readjustment of such regimes to accommodate the current energy transition trends. It identifies the need to account for the new classes of risks that are associated with renewable energy sources and other alternative sources, calling for a critical assessment of best practices that should be employed in addressing health and safety in sustainable energy development.

This article contends that health and safety issues have been on the front burner in the energy sector; particularly in the oil and gas sector.⁵ The oil and gas sector, like any other industrial sector, therefore come with series of risks from the operations that can adversely impact on health and safety. These implications include bodily harms,

¹ Mohammad Danish and Rima J Isaifan, 'Strategic Plans to Support Action against Climate Change in the Arab Countries in the Middle East Region' (2024) 15(1) *The Journal of Sustainable Development, Law and Policy* 304-335, 304

² Peter Kayode Oniemola, 'A Proposal for Transnational Litigation against Climate Change Violations in Africa' (2021) 38(2) *Wisconsin International Law Journal* 301, 304-305.

³ United Nations, 'Climate Action and Support Trends' (2019) <https://unfccc.int/sites/default/files/resource/Climate_Action_Support_Trends_2019.pdf> accessed 1 June 2024

⁴ Oliver Hailes and Jorge E Vinueles, 'The Energy Transition at a Critical Juncture' (2023) 26 *Journal of International Economic Law* 627-648, 630.

⁵ Enaruna Ehimwenma Idubor and Michael D Oisamoje, 'An Exploration of Health and Safety Management Issues in Nigeria's Effort to Industrialize' (2013) 9(12) *European Scientific Journal* 154-169.

injuries,⁶ diseases and deaths.⁷ It will be imperative that laws should be put in place to address the peculiarities brought by energy transition technologies which pose different risks from those that have been seen in fossil fuel technologies. Therefore, the environmental and safety rules put in place for a particular sector and infrastructure may be tailored differently.⁸ The article is divided into four parts. The first part sets the context identifying that there are emerging risks from energy transition which laws should be developed to address. The second part of the article examines the health and safety issues and notable disasters that have been recorded in the energy sector globally, pointing out the implications. The third part addresses energy transition and emerging implications of health and safety risks, and critically discuss the liability risks that could be associated with energy transition. Part four on the other hand calls for the development of health and safety regulations that meet the peculiarities of energy transition technologies.

2. HEALTH AND SAFETY ISSUES IN THE ENERGY SECTOR AND NOTABLE DISASTERS

The traditional energy sector has over the years been developed in the world with documented facts of risks that have been recorded in the sector as well as scientific support for the potential risks that may arise from the utilisation of energy resources.⁹ The oil and gas sector has been categorised into the upstream, midstream, and downstream sectors, with each of the sectors having different degrees of risk. These risks could be catastrophic, as seen in a series of operational risks leading to blowouts.¹⁰ The processes involved in the exploration, mining, refining, transportation, and combustion of oil and gas have some risks that affect the health and safety of workers and the host communities. Occupational health and safety issues are common in the oil and gas industry, as there is exposure to hazards due to accidents, blowouts, and exposure to substances that are toxic. Particularly, spillages have adverse environmental

⁶ UNDRR, 'Safety Hazards Associated with Oil and Gas' <<https://www.undrr.org/understanding-disaster-risk/terminology/hips/tl0034>> accessed 1 June 2024.

⁷ Melissa Haswell, Jacob Hegedus and David Shearman, 'The Risks of Oil and Gas Development for Human Health and Wellbeing: A Synthesis of Evidence and Implications for Australia' (2023) Office of the Deputy Vice Chancellor (Indigenous Strategy and Services), University of Sydney; Kehinde Anifalaje, 'Emerging Trends in the Regulation of Social Security' (2016) 43(2) *Journal of Malaysian and Comparative Law* 1-30; Kehinde Anifalaje, 'A Social Security Perspective of Employees' Compensation Law in Nigeria' (2021) 10(2) *The Journal of Corporate and Commercial Law and Practice* 45-82.

⁸ Ignacio Herrera Anchustegui and Rudiger Tscherning, 'Offshore Oil and Gas Infrastructure Electrification and Offshore Wind: A Legal Exploration' (2024) 17(1) *The Journal of World Energy Law and Business* 35, 47.

⁹ Ngozi Chinwa Ole and Eti Best Herbert, 'The Nigerian Offshore Oil Risk Governance Regime: Does the Petroleum Industry Act 2021 address the Existing Gaps' (2022) *Studia Iuridica Lublinensia* 143-163.

¹⁰ T Acheampong and R Akumperigya, 'Offshore risk regulation: A comparative analysis of regulatory framework in Ghana, the United Kingdom and Norway' (2018) 113 *Energy Policy* 701-710.

hazards,¹¹ affecting lives and resulting in respiratory and skin diseases.¹² Some of the respiratory health challenges include asthma, bronchitis and so on.¹³

These safety issues are also a regular occurrence with gas extraction as they are with oil extraction. Although, natural gas is considered a cleaner source of energy, but they are highly combustible and dangerous.¹⁴ For example, hydraulic fracturing in natural gas extraction comes with some concerns of health and safety because they can pollute water and air as well as exposing workers and communities to health risks.¹⁵ A notable example in the oil and gas sector is the Piper Alpha Disaster of 1988 that claimed the lives of 165 of the 226 men on board the oil platform.¹⁶ In addition, 2 persons of the rescue team lost their lives. This disaster was noted as a major disaster in the UK history.¹⁷ The Piper Alpha oil platform, which was owned by Occidental Petroleum, was situated off the coast of Aberdeen, Scotland. Up until the explosion that became known as the Piper Alpha oil platform disaster, the platform was in operation for about 12 years and exported about 125,000 barrels of oil every day.¹⁸ On 6 July 1988, the Piper Alpha oil platform exploded. This explosion caused the death of about three-fourths of the men on board the oil platform.¹⁹ The bodies of thirty of the deceased could not be recovered.

¹¹ During war, the protection of the environment is sacrosanct let alone its protection in peace time. Environment can only be destroyed during war unless it is absolutely necessary. See M Adigun, 'Boko Haram's Radical Ideology and Islamic Jurisprudence' in J-M Iyi and H Strydom (eds) *Boko Haram and International Law* (Springer 2018) 205–235, 229.

¹² Jon Gay, Olivia Shepherd, Mike Thyden and Matt Whitman, 'The Health Effects of Oil Contamination: A Compilation of Research' (Collaborative Project at Worcester Polytechnic Institute, 2010) <<https://digital.wpi.edu/downloads/hq37vp13r>> accessed 1 June 2024

¹³ Fatoumata Binta Barry, 'Environmental Injustices: Conflict & Health Hazards in the Niger Delta' (Dissertation in International Affairs and Natural Resources and Sustainable Development, The American University School of International Service 2010)

¹⁴ Ottmar Edenhofer and others, *Renewable Energy Sources and Climate Change Mitigation: Special Report of the Intergovernmental Panel on Climate Change* (Technical Support Unit Working Group III and Potsdam Institute for Climate Impact Research) (Cambridge University Press 2012) 76

¹⁵ Joanna Glowacki and Christoph Henkel, 'Hydraulic Fracturing in the European Union: Leveraging the U.S. Experience in Shale Gas Exploration and Production' (2014) 24(1) *Ind. Int'l & Com. L. Rev.* 133–182, 172

¹⁶ Marc Reid, 'The Piper Alpha Disaster: A Personal Perspective with Transferrable Lessons on the Long-Term Moral Impact of Safety Failures' (2020) 27(2) *ACS Chemical Health & Safety* 88–95, 88

¹⁷ At a debate to commemorate the 25th anniversary of the Piper Alpha tragedy, the UK Parliament acknowledged it as 'the worst tragedy in the offshore oil and gas industry anywhere in the world'. See Frank Doran, 'Piper Alpha Disaster' (UK Parliament, 11 July 2013) <<https://hansard.parliament.uk/commons/2013-07-11/debates/13071159000003/PiperAlphaDisaster>> accessed 3 June 2024

¹⁸ Victoria Atkinson, 'An Analysis of the Piper Alpha Oil Platform Disaster Using Actor-Network Theory' (STS Research Paper, Faculty of the School of Engineering and Applied Science, University of Virginia 2022) <https://libraetd.lib.virginia.edu/downloads/qv33rx53k?filename=Atkinson_Victoria_STS_Research_Paper.pdf>

¹⁹ *Ibid.*

It was later determined during investigations that the disaster was caused by a gas leak. The operations on the oil platform entailed the extraction of oil from underneath the ocean floor. However, the oil extracted came with natural gas and salt-water brine. After the extraction, a technical procedure was done to separate the water from the oil after which the gas is separated to extract gas condensate liquid. When this is done, the gas condensate is then pumped back into the oil. There were two condensate pumps being used on the platform at the time. On the day of the disaster, one of the pumps was being prepared for routine maintenance and so was put out of use. The safety equipment on the pump were removed and maintenance work began. However, the maintenance could not be completed that day, and it was planned to be completed the following day. While the maintenance was ongoing, the crew began to use the second pump. During the night, the second pump stopped working and this would have caused the oil rig to shut down as it was without a functioning pump. Efforts to get the second pump to begin working again failed and then the crew decided to use the first pump, which at the time was undergoing maintenance. This decision was a fatal one as all safety equipment on the first pump had been removed before maintenance work started. Without the pressure safety valve, there was a high-pressure gas leak which caused multiple explosions leading to the deaths of many and the pollution of the North Sea.²⁰ This was an avoidable disaster and in the words of Frank Doran, was a 'direct consequence of negligence, bad management at every level, poor maintenance, extremely weak regulation and failure to have proper work systems in place or a proper safety strategy for major incidents.'²¹

On 23 March 2005, the BP Texas City Refinery recorded an accident which resulted in the deaths of 15 people and over 170 injured people.²² At the time of the accident, it was one of the worst workplace disasters recorded in the U.S. During investigations, the U.S. Chemical Safety and Hazard Investigation Board discovered that key alarms that should have notified and warned operators at the British Petroleum's (BP) refinery were not working and that the refinery had safety problems that were really concerning, drawing from previous accidents that had occurred in the past year.²³ Before the accident, there had been several warnings concerning the deficiency of the maintenance and front-line risk management at the refinery.²⁴ It was also discovered that the company ignored safety and maintenance regulations in a bid to generate more

²⁰ Ibid.

²¹ Frank Doran, 'Piper Alpha Disaster' (UK Parliament, 11 July 2013) <<https://hansard.parliament.uk/commons/2013-07-11/debates/13071159000003/PiperAlphaDisaster>> accessed 4 June 2024

²² The Report of the BP U.S. Refineries Independent Safety Review Panel 2007 <<http://sunnyday.mit.edu/Baker-panel-report.pdf>> accessed 5 June 2024

²³ U.S. Chemical Safety and Hazard Investigation Board, 'BP American Refinery Explosion' (Public Meeting, 20 March 2007) 5 <http://www.csb.gov/assets/document/BP_Transcript_1.pdf> accessed 4 June 2024

²⁴ Rena Steinzor and Anne Havemann, 'Too Big to Obey: Why Bp Should Be Debarred' (2011) 36(1) William & Mary Environmental Law and Policy Review 81-118, 81

revenue.²⁵ The BP Texas Explosion is not the only accident that BP has been involved in. Many of the accidents that have occurred at the company facilities have been linked to non-compliance with safety rules and regulations. At a time, a former BP employee instituted a suit against the company based on the allegation that his employment was terminated because he was trying to ensure that compliance was maintained.²⁶

Another notable incident is the Deep-water Horizon that resulted in a serious spill in the Gulf of Mexico and affected the marine environment.²⁷ On 20 April 2010, there was an explosion at the BP Deepwater Horizon oil drilling rig.²⁸ The Deepwater Horizon is another accident occurring in one of British Petroleum's facilities. The failure of the company to prioritize compliance with safety regulations over generating revenue led to the explosion of its drilling rig. The explosion was caused by high-pressure methane gas which rose from the Macondo oil well into the rig.²⁹ At the time of the spill, it was recorded as 'the worst maritime environmental disaster in U.S history.'³⁰ It caused a spillage of about 4.9 million barrels of crude oil into the Gulf of Mexico which continued to flow for 3 months after the explosion.³¹ This incident also left 11 people dead, whose bodies were never found, and 17 others injured.³² The workers involved in the clean-up were exposed to serious health and safety problems.³³ As with other accidents in the energy sector, this too could have been avoided. Its cause has been traced to non-functioning equipment and human errors.³⁴

Interestingly, before 2010, when the spill occurred, the U.S Federal Government had forbidden the drilling of oil off the coasts of the Pacific and Atlantic in about 48 states.³⁵ This decision was taken after an oil spill in 1969 and for many decades after, oil drilling

²⁵ Joshua Ozymy and Melissa Jarrell Ozymy, 'Lone Star Crime: The Criminal Enforcement of Environmental Law in the State of Texas' (2023) 54(4) St. Mary's Law Journal 1095-1124, 1097

²⁶ Oliver A Houck, 'Worst Case and the Deepwater Horizon Blowout: There Ought to Be a Law' (2010) 24(1) Tulane Environmental Law Journal 1-18, 6

²⁷ John C Cruden, Steve O'Rourke and Sarah D Himmelhoch, 'The Deepwater Horizon Oil Spill Litigation: Proof of Concept for the Manual for Complex Litigation and the 2015 Amendments to the Federal Rules of Civil Procedure' (2016) 6(1) Michigan Journal of Environmental & Administrative Law 65-149

²⁸ James E Hickey Jr, 'Law-Making and the Law of the Sea: The BP Deepwater Horizon Oil Spill in the Gulf of Mexico' in Rain Livoja and Jarna Petman (eds), *International Law-making: Essays in Honour of Jan Klabbbers* (Routledge 2013) 270.

²⁹ Ibiere Helen Jumbo and Ngozi Chinwa Ole, 'A Critical Appraisal of the Nigerian Offshore Risk Governance Regime: Post Macondo' (2019) 3 African Journal of International Energy, Environmental Law and Policy 1.

³⁰ Joshua Ozymy and Melissa Jarrell Ozymy, 'Lone Star Crime: The Criminal Enforcement of Environmental Law in the State of Texas' (2023) 54(4) St. Mary's Law Journal 1095-1124, 1097.

³¹ Hickey Jr, 270.

³² Oliver A Houck, 'Worst Case and the Deepwater Horizon Blowout: There ought to be a Law' (2010) 24(1) Tulane Environmental Law Journal 1-18, 1.

³³ John C Cruden, Steve O'Rourke and Sarah D Himmelhoch, 89

³⁴ Ibid. 2.

³⁵ Russell V Randle, 'Spills of National Significance and State Nullification' (2010) 16(2) Ocean and Coastal Law Journal 355-374, 360.

off the coasts was limited. In March 2010, the Federal Government lifted the restriction allowing offshore drilling. Less than a month after, the Deepwater Horizon accident occurred.³⁶ This incident raised concerns about the health and safety risks that are associated with drilling in deepwater. Although, BP pled guilty and was convicted on criminal charges brought against it and had to pay penalties and damages to the families of the deceased, it does not change the fact that irreparable damage had been done, not just to individuals who lost their loved ones but to the marine environment which is a vital part of the ecosystem.

Another fossil fuel that has raised health and safety issues is coal. Coal, which is another traditional source of energy, can be considered the dirtiest of all.³⁷ It has also been associated with the release of noxious gasses that can cause cancer, asthma, bronchitis etc.³⁸ Miners have been exposed to risks of diseases such as pneumoconiosis caused by inhalation of coal dust, most especially due to long term exposure.³⁹ This is as a result of particulate matter, sulphur dioxide, and nitrogen oxides causing respiratory illnesses, cardiovascular diseases, and deaths. On 21 October 1966, one of the worst coal disasters happened in Aberfan, Wales. For several years, waste debris from a coal mine had been piled up in a heap as high as 131 feet.⁴⁰ Heavy rain caused a landslide of the pile of debris which flowed into the village at a high speed. 20 houses and 2 schools were damaged causing the loss of 144 lives including 116 children, who had just gone into the school building minutes before the disaster.⁴¹ Investigations revealed that the mine owner had been cautioned several times about the danger posed by the heap of debris which had continuously been piled but nothing was done about it.

On 5 April 2010, there was an explosion in a coal mine at Montcoal, West Virginia leading to the death of 29 coal miners.⁴² This coal mine, the Upper Big Branch, was located in a part of the West Virginia that was known to record several fatal accidents and was very deadly.⁴³ At the time of the explosion, it was recorded as the 'worst mining disaster in the United States in 40 years.'⁴⁴ Investigations later revealed that the explosion was likely caused by methane or natural gas that had been released from the

³⁶ Ibid

³⁷ Hannah Ritchie, 'What are the safest and cleanest sources of energy?' (Our World in Data, 10 February 2020) <<https://ourworldindata.org/safest-sources-of-energy>> accessed 3 June 2024.

³⁸ ELAW, 'Coal Litigation Strategies' <<https://elaw.org/coal>> accessed 3 June 2024.

³⁹ Noemi B Hall, David J Blackley, Cara N Halldin, and A Scott Laney, 'Current Review of Pneumoconiosis Among US Coal Miners' (2019) 6(3) Curr Environ Health Rep. 137-147.

⁴⁰ Laura M Stough, Donghyun Kang and Sungyoon Lee, 'Seven School-Related Disasters: Lessons for Policymakers and School Personnel' (2018) 26(100) Education Policy Analysis Archives 1-27, 13

⁴¹ Jeffrey Hilgert, *Hazard or Hardship: Crafting Global Norms on the Right to Refuse Unsafe Work* (1st ed, Cornell University Press 2014) 122.

⁴² Cassandra Tate, 'The Upper Big Branch Mine Explosion: Occupational Hazard or Preventable Tragedy: A Look at State-Corporate Crime' (Thesis submitted at Eastern Kentucky University, 2013).

⁴³ Ibid at 13.

⁴⁴ Ibid at 14.

ground and ignited by the sparks created during the mining process.⁴⁵ It was normal for sparks to occur during mining, however, one safety requirement which was ignored was the use of water sprays which should have been used to put out flames whenever there was an ignition. In the course of investigations, it was discovered that the water sprays were ineffective which was why the crew could not put out the first flames that eventually led to the explosion. The flames spread rapidly, and the explosion was quick because it was aided by the coal dust that had accumulated over time in previous mining sessions. An additional cause of the explosion was the insufficient ventilation in the mine.⁴⁶ The explosion could have been avoided and its cause can be directly traced to the failure of the mine owner, Performance Coal Company, to comply with safety regulations. On several occasions, the mine owner had been cited by regulatory officials for violations of safety regulations, but it still failed to comply with the regulations.

There are also examples in relation to nuclear energy. The Chernobyl Nuclear Power Plant recorded an explosion, which is said to be 'the worst accident in the history of nuclear energy.'⁴⁷ This explosion occurred in the former Soviet Union in present day Ukraine.⁴⁸ The accident occurred on 26 April 1986, when a nuclear reactor at the Power Plant exploded causing the release of radioactive emissions into the air. These emissions spread across the Soviet Republic, extending to the whole of Europe⁴⁹ and North America.⁵⁰ An unconfirmed number of people lost their lives in this accident and as a result of the emissions, thousands of persons suffered from long-term cancer which eventually led to their deaths. It has been estimated that the cancer related deaths range from between 14,000 to 475,000 people across the world.⁵¹ The losses suffered were not limited to deaths. There were economic consequences too as the agricultural sector of many European countries suffered untold losses due to the contamination of plants and animals by the radioactive emissions.⁵² It has been almost impossible to get an estimate of the long-term damage caused by this disaster.⁵³ Unfortunately, neither the Soviet Union nor Chernobyl has been held legally responsible for the level of loss and damage caused to lives and properties. Instead of being made to take responsibility and shut

⁴⁵ James W Harlow, 'Corporate Criminal Liability for Homicide: A Statutory Framework' (2011) 61 *Duke Law Journal* 123-166, 123.

⁴⁶ James W Harlow, 'Corporate Criminal Liability for Homicide: A Statutory Framework' (2011) 61 *Duke Law Journal* 123-166, 124.

⁴⁷ Linda A Malone, 'The Chernobyl Accident: A Case Study in International Law Regulating State Responsibility for Transboundary Nuclear Pollution' (1987) 12 *Columbia Journal of Environmental Law* 203-241.

⁴⁸ Justin Mellor, 'The Negative Effects of Chernobyl on International Environmental Law: The Creation of the Polluter Gets Paid Principle' (1999) 17(1) *Wisconsin International Law Journal* 65-86, 65.

⁴⁹ Devereaux F McClatchey, 'Chernobyl and Sandoz One Decade Later: The Evolution of State Responsibility for International Disasters, 1986-1996' (1996) 25(3) *Georgia Journal of International & Comparative Law*, 659-680, 661.

⁵⁰ Mellor, 65.

⁵¹ McClatchey, 661.

⁵² *Ibid.*

⁵³ Helmut J. Heiss, 'Legal Protection against Transboundary Radiation Pollution: A Treaty Proposal' (2011) 4(2) *Fordham Environmental Law Review* 167-194, 168.

down operations at the plant, the Ukrainian government continued to operate the plant until 1995 when it finally agreed to shut it down in exchange for financial aid from the western countries.⁵⁴

Another notable incident is the 2011 Fukushima Daiichi Nuclear Disaster. This was a nuclear power related accident that occurred in Japan on 11 March 2011.⁵⁵ Unlike many other accidents which have been directly linked to human errors, this was triggered by two devastating natural disasters – a 9.0 magnitude earthquake and a tsunami.⁵⁶ Human errors were not totally excused as it was discovered that the plant had poor infrastructure which could not withstand the effects of the natural disasters. The two natural disasters caused damage to infrastructure at the Fukushima nuclear power plant and made it impossible to maintain a certain cooling temperature at the plant. As a result, there were radioactive emissions into the atmosphere.⁵⁷ After the incident, there were several debates and protests against the use of nuclear power.⁵⁸ Therefore, there is much policy concerns on the use of nuclear owing to the safety issues.⁵⁹

3. TRADITIONAL HEALTH AND SAFETY LAWS: THE UNITED STATES OF AMERICA AND THE UNITED KINGDOM

Health and safety laws are usually put in place to offer protection to and ensure risks are addressed. Health and safety may be directed to protect the general public, occupants or employees depending on the aim. The laws and regulations are largely prescriptive.⁶⁰ For example the United States Congress passed the Occupational Safety and Health (OSH) Act in 1970 with the primary objective of maintaining a safe working environment free from hazards that can jeopardise the health, wellbeing and safety of workers.⁶¹ This, it aimed to do by mandating all employers to ensure that the place of employment is “free from recognised hazards that are causing or are likely to cause death or serious physical harm to his employees”.⁶² There are reporting obligations requiring employers to report within eight hours an occurrence involving a workplace

⁵⁴ Mellor 65.

⁵⁵ Stephen G Burns, ‘The Fukushima Daiichi Accident: The International Community Responds’ (2012) 11(4) Washington University Global Studies Law Review 739-779, 739.

⁵⁶ Ibid. 741.

⁵⁷ Ibid. 744.

⁵⁸ Michael J Walker and Elise M Henry, ‘Response to The Changing Perspectives of U.S. and Japanese Nuclear Energy Policies in the Aftermath of the Fukushima Daiichi Disaster (By Daniel A. Dorfman)’ (2012) 30(1) Pace Environmental Law Review 291-298, 292.

⁵⁹ Hari Krishnan Govindarajan and LS Ganesh, ‘A Morphological Analysis of Energy Policy Analysis Research—Emerging Issues and Concerns’ (2021) 14(5) Journal of World Energy Law and Business 313, 319.

⁶⁰ K Liu, ‘Regulating health and safety at the workplace: prescriptive approach vs goal-oriented approach’ (2019) 120 Safety Science :950, 950.

⁶¹ Section 1 Occupation and Safety (OSH) Act 1970.

⁶² Section 5(a) OSH Act 1970.

death or workplace incidence where three or more workers are hospitalised.⁶³ It is also mandatory to record any fatal heart attacks that occur while on the job. Inspectors are allowed to access, examine, investigate any workplace that is subject to the Act during normal business hours.⁶⁴ Employers who violate this mandatory provision are likely to be penalised.⁶⁵ The compulsion on employers to abide by the rules on safety is a necessary step in ensuring safety in places of employment, especially in the energy industry. The OSH Act also established the National Institute for Occupational Safety and Health to conduct research and “develop and establish recommended occupational safety and health standards”.⁶⁶ By so doing, the Act has been able to ensure that occupation safety regulations are updated from time to time to address current situations that may arise in employment safety conditions. Research has shown that since the enactment of the OSH Act, there has been a reduction in work-related accidents in the U.S.⁶⁷

Another key body in enforcing safety in the U.S. energy industry is the Bureau of Safety and Environmental Enforcement (BSEE). The BSEE was a successor of the Minerals Management Service (MMS). The MMS, established in 1982, had the responsibility of managing the US oil and gas industry, including ensuring the “regulation of health safety and environment”.⁶⁸ However, it would seem that the MMS focused less on the aspect of its functions that dealt with safety regulations. After the Deepwater explosion of 2010, MMS was rebranded and eventually broken into three different regulatory bodies, one of which is the Bureau of Safety and Environmental Enforcement.⁶⁹ The BSEE is tasked with the responsibility of enforcing safety regulations and environmental protection on the U.S. Outer Continental Shelf.⁷⁰ The BSEE functions by splitting its responsibilities among its six divisions.⁷¹ These divisions are focused on various subject matters such as regulation compliance, oil spill preparedness, safety and incident investigation. By breaking up MMS and creating the BSEE, the U.S. took a right step in enforcing safety regulations. Since it was established in 2011,⁷² there has hardly been a record of offshore oil disasters that claimed several lives. Quite a number of the disasters discussed earlier in this paper occurred in the United States, hence its

⁶³ Section 8 OSH Act 1970.

⁶⁴ Section 8 OSH Act 1970.

⁶⁵ Section 17 OSH Act 1970.

⁶⁶ Section 22(c)(1) OSH Act 1970.

⁶⁷ John Howard and Frank J Hearl, ‘Occupational Safety and Health in the USA: Now and the Future’ (2012) 50(2) *Industry Health* 80-83, 80

⁶⁸ Loulan J Pitre, ‘Regulation of Safety and Health on U.S Offshore Wind Energy Facilities’ (2021) <<https://www.cailaw.org/media/files/IEL/Publications/2021/november/Pitre.pdf>> accessed 24 August 2024, 1-17, 2

⁶⁹ *ibid*

⁷⁰ Bureau of Safety and Environmental Enforcement <<https://www.bsee.gov/>> accessed 24 August 2024

⁷¹ Bureau of Safety and Environmental Enforcement ‘Our Organization’ <<https://www.bsee.gov/about-bsee/our-organization>> accessed 24 August 2024

⁷² US Department of the Interior ‘Bureau of Safety and Environmental Enforcement’ 25-30, 26 <<https://www.doi.gov/sites/doi.gov/files/uploads/fy2021-bib-bh025.pdf>> accessed 24 August 2024

choice as the jurisdiction to examine its health and safety laws. Many disasters that have been recorded in the U.S. energy industry happened while there were people working. This raised concerns about the safety of workers in energy industry. This concern has been addressed by the OSH Act.

In the United Kingdom, the significant legal structure for health and safety is the United Kingdom⁷³ Ensuring health and safety in the workplace in the UK is the responsibility of the Health and Safety Executive (HSE), which is the primary regulator of health and safety in the UK.⁷⁴ HSE also works to ensure that work-related death and injuries are prevented as much as possible. The HSE was established under the Health and Safety at Work Act 1974.⁷⁵ The Act was enacted with the objective of protecting employees and other persons who are likely to be affected by the activities of the workplace from things that can pose a risk to their health and safety.⁷⁶ Every employer is tasked with the duty of ensuring that the health, safety and welfare of their employees while working are protected.⁷⁷ The Act also mandates employers or anyone in charge of work premises, to prevent the emission of noxious or offensive substances from the work premises.⁷⁸ One good thing about the Act is that it makes it an offence for anyone to contravene the mandatory provisions to ensure health and safety of employees⁷⁹ and also provides for the applicable penalty. The penalty ranges from an imprisonment not exceeding 12 months to 2 years or a fine not exceeding £20,000.⁸⁰

The HSE takes records of work-related injuries in Great Britain. According to data provided by the HSE in 2022/23, there were almost 61,000 cases of workers who had non-fatal injuries at the workplace.⁸¹ Other records provided by HSE are 1.8 million working people suffering from a work-related illness, of which 875,000 workers suffering work-related stress, depression or anxiety; 473,000 workers suffering from a work-related musculoskeletal disorder; 2,257 mesothelioma deaths due to past asbestos exposures (2022); 138 workers killed in work-related accidents (2023/24); 561,000 working people sustained an injury at work according to the Labour Force Survey; 60,645 injuries to employees reported under Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013.⁸² The U.K also has the Workplace (Health, Safety and Welfare) Regulations 1992. The regulations contain a number of

⁷³ Richard Matthews and James Ageros, *Health and Safety Enforcement: Law and Practice* (Oxford University Press, 2010) 1.

⁷⁴ Section 18 Health and Safety at Work etc. Act 1974

⁷⁵ Section 10 Health and Safety at Work etc. Act 1974

⁷⁶ Section 1 Health and Safety at Work etc. Act 1974

⁷⁷ Sections 2 and 3 Health and Safety at Work etc. Act 1974

⁷⁸ Section 5 Health and Safety at Work Act 1974

⁷⁹ Section 33 Health and Safety at Work etc. Act 1974

⁸⁰ Schedule 3A, Health and Safety at Work etc. Act 1974

⁸¹ Health and Safety Executive, 'Non-fatal injuries at work in Great Britain' <<https://www.hse.gov.uk/statistics/causinj/index.htm>> accessed 29 August 2024

⁸² Health and Safety Executive, 'Overview' <<https://www.hse.gov.uk/statistics/overview.htm>> accessed 29 August 2024

requirements that all employers are mandated to implement in the workplace. One of these requirements is to ensure that the workplace and all equipment used in work operations are well maintained.⁸³

It is safe to say that the traditional health and safety regime tried to maintain a high standard having been developed over several decades and had regulations touching every aspect where issues were known to arise. The wellbeing and safety of workers as well as that of other persons were given top priority. There were applicable penalties and fines for any defaulter whose actions caused damage to the health and safety of others. Health and safety issues have been regulated from a general perspective. For example, the Health and Safety at Work etc. Act 1974, makes it obligatory for an employer to 'ensure, so far as reasonably practicable, the health, safety and welfare at work of all his employees.'⁸⁴ It is also obligatory that an employer should 'conduct his undertaking in a way as to ensure so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not exposed to risks to their health and safety.'⁸⁵ Likewise, the Management of Health and Safety at Work Regulations 1999 requires employers to take suitable and sufficient health and safety assessment of the risks that the employees may be exposed to.⁸⁶ A look at this legislation will indicate that it should in large extent apply in cases of energy transition technologies. However, there may be loopholes that the general health and safety regime may not envisage. Hence, there is the imperative to have a specific regime that addresses the peculiarities. There may also be regulations that address the health and safety in a specific sector as seen in the oil and gas sector given its peculiarities. For example, there exists series of regulations in the United States of America and Canada that have been directed at addressing methane because of the nature of its health and safety impacts among other policy considerations.⁸⁷

⁸³ Regulation 5, Workplace (Health, Safety and Welfare) Regulations 1992.

⁸⁴ Section 2. See ACL Davies and Lisa Rodgers, 'Towards a More Effective Health and Safety Regime for UK Workplaces Post COVID-19' (2023) 52(3) *Industrial Law Journal* 665, 668.

⁸⁵ Section 3. See Davies and Rodgers, 668.

⁸⁶ Davies and Rodgers, 668.

⁸⁷ See Allan Ingelson, 'Plugging the Holes—New Canadian and US Regulations to Reduce Upstream Methane Emissions' (2019) 12(4) *The Journal of World Energy Law and Business* 294, 301. The UK has an avalanche of regulations such as Offshore Installations (Safety Case) Regulations 2005; Offshore Installations and Pipeline Works (First-Aid) Regulations 1989; The Control of Major Accident Hazards Regulations 2015 (COMAH); The Petroleum (Production) (Landward Areas) Regulations 1988; The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995; The Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015; and The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013.

4. ENERGY TRANSITION AND THE IMPLICATIONS OF HEALTH AND SAFETY RISKS

The move for clean energy has brought about the development of new technologies.⁸⁸ Countries should be moving in different approaches that bring about the deployment of sustainable energy through policies. The trend in energy transition has been changing the perspectives that have been associated with health and safety in the oil and gas sector. The development of practices and policies for the support of renewable energy has been approached from the need to protect the environment and promote economic development. It is now being appreciated that health and safety are equally very important but not strictly considered in the sector. There exist some implications on health issues due to risks that are occasioned by exploration and production of fossil fuels leading to the pollution of air, land and water.⁸⁹ On the other hand, the development and utilisation of alternative energy such as renewable energy also has series of risks that are associated with them. It becomes important that in matters of development of the sector for transitioning into low carbon development path, implementation mechanisms that factor in health and safety become very paramount and should be given much consideration.

New forms of risks continue to arise with the development of new sets of technologies in the energy sector to meet the obligation of decarbonisation. Therefore, renewable energy sources are in the frontline of the questions of health and safety risks in the energy sector. Some of these risks are scientifically explained, others are technical while some are physically felt and perceived either instantly or overtime. It is indisputable that fossil fuels cause health and safety risks and several research studies have been able to evaluate the level of risks associated with the use of conventional sources of energy. It is also certain that modern sources of energy also have risks. A report of the National Research Committee published in 1980 admitted that the level of risks posed by the cleaner sources of energy could not be ascertained or estimated.⁹⁰ As at that time, it was quite early to ascertain the risks posed by modern energy. Decades later, there has been sufficient time to analyse the possible risks that could be posed by energy transition. These include health risks, legal risks, policy and regulatory risks, technological risks, and economic risks among others. The most prominent of these risks, especially as it relates to this paper, are the health risks.

⁸⁸ Asif Raihan, Monirul Islam Pavel, Dewan Ahmed Muhtasim, Sadia Farhana, Omar Faruk and Arindrajit Paul, 'The Role of Renewable Energy Use, Technological Innovation, and Forest Cover Toward Green Development' Evidence from Indonesia' (2023) 2(1) *Innovation and Green Development* 1-12, 2.

⁸⁹ Melissa Haswell, Jacob Hegedus and David Shearman, 'The Risks of Oil and Gas Development for Human Health and Wellbeing: A Synthesis of Evidence and Implications for Australia' (2023) Office of the Deputy Vice Chancellor (Indigenous Strategy and Services), University of Sydney.

⁹⁰ National Research Council, *Energy in Transition, 1985-2010: Final Report of the Committee on Nuclear and Alternative Energy Systems* (The National Academies Press 1980, ch 9, 422-499, 427), <<https://nap.nationalacademies.org/read/11771/chapter/10>> accessed 5 June 2024

Poor maintenance of infrastructure could lead to the collapse of high and heavy equipment used on the energy plants which may fall on workers, killing or severely injuring them. There is also the possibility of workers falling off high heights or being electrocuted while working. A 2020 report revealed that there were 532 reported safety incidents in the UK wind energy sector.⁹¹ Some of these incidents required first aid treatments while some others required medical treatments. Another possible way accidents may occur is the removal of wind turbine blades which could pull out, be thrown around and injure workers or other people in the vicinity.⁹²

Apart from health risks, legal issues may arise as to the violations of human rights associated with the operation of a renewable energy sites.⁹³ As with fossil fuels, renewable energy requires the utilisation of natural resources. This, many times, means the violation of the human rights of people around the area where the energy plant is situated. An example of such violation of human rights occurred in France with the development of the Gunaá Sicarú wind farm project. To effectively utilise wind energy, large wind farms have to be constructed covering large hectares of land. This sometimes means the heavy exploitation of wind resources, often to the detriment of the residents of the local communities. Some communities have had to protest the operations of wind farms in their vicinity citing the pollution of their water by oil flowing from the wind turbines. Another reason for the protest is the noise made in the wind farm which they claim disturbs the local birdlife and the peaceful living of residents.⁹⁴ In response to the protests against the development of the Gunaá Sicarú wind farm project in France, members of the local community were alleged to have received death threats.⁹⁵ Other forms of human rights violations could include land-grabbing and the forced displacement of people living in areas considered suitable for siting renewable energy plants.⁹⁶ It could also include the interference with network waves and television

⁹¹ SafetyOn, '2020 Onshore Wind Health and Safety Incident Data Report' 1-27, 6 <https://safetyon.com/_data/assets/pdf_file/0018/855000/SafetyOn-2020-incident-data-reportjk2.pdf> accessed 6 June 2024

⁹² Adrian J Bradbrook, 'Creating Law for Next Generation Energy Technologies' (2011) *Journal of Energy & Environmental Law* 17-38, 35.

⁹³ On the need for promoting human rights, see Muyiwa Adigun, 'Enforcing ECOWAS Judgments in Nigeria through the Common Law Rule on the Enforcement of Foreign Judgments' (2019) 15 *Journal of Private International Law* 130-161, 159.

⁹⁴ Yogi Bratajaya, 'When the Race to Net Zero Becomes a Race to the Bottom: Human Rights Violations in the Renewable Energy Transition and the Extraterritorial Obligation to Protect Human Rights' (2023) 38(2) *American University International Law Review* 321-358, 339

⁹⁵ *Ibid.* 340

⁹⁶ Hansika Agrawal, Laura El-Katiri, Kimathi Muiruri and Sam Szoke-Burke, 'Enabling a Just Transition: Protecting Human Rights in Renewable Energy Projects: A Briefing for Policymakers' (2023) 4 *Columbia Center on Sustainable Investment* 1-23, 4

reception.⁹⁷ There may also be associated risks in the course of decommissioning as in the case of offshore wind.⁹⁸

In addition, the host communities of solar energy plants may likely suffer from erosion. This is connected to the fact that the sites where solar panels are installed need to be cleared and levelled; the green plants and trees on the sites are uprooted creating room for water to flow unrestricted,⁹⁹ thereby causing erosion.

Biomass, another source of renewable energy, is usually classified as a clean source of energy with no carbon emissions; however, it has been proven that biomass generated from woody materials can emit carbon when burned as they have already absorbed carbon.¹⁰⁰ This may not necessarily be a health risk, because even if the woody materials are not burned for biomass, they would eventually decay and still emit the carbon in them.

Another risk is insufficient policies and regulations. Every area of a developing community needs to be regulated. An unregulated sector gives room for chaos, unchecked harm and damage to the health and safety of the people. Although the energy sector is heavily regulated; the legal regime on safety in the energy sector has been primarily focused on fossil fuels. This is not surprising as fossil fuels have always been around, and national and international regulatory bodies have had time to study the operations and generate regulations that are all-inclusive. This may not be so easy with energy transitioning. It has been acknowledged that the speed of technological development often poses a regulatory challenge for governments, that is, it is sometimes difficult for governments to catch up with the new innovations being introduced and updated from time to time.¹⁰¹ The existing regulations may not be adequate to resolve the challenges that would arise with energy transition. It may take a long time to bridge the regulatory gap in energy transitioning.

The Carbon capture and storage (CCS) was recognised by the UNFCCC as an important tool in the decarbonisation goal.¹⁰² The Paris Agreement does not expressly stipulate the use of CCS; however, the Agreement laid a foundation for CCS as a means

⁹⁷ Bradbrook, 35.

⁹⁸ M Shafiee and T Adedipe, 'Offshore Wind Decommissioning: An Assessment of the Risk of Operations' (2022) 41(8) *International Journal of Sustainable Energy* 1057–1083.

⁹⁹ Agrawal et al, 4.

¹⁰⁰ Christine Elizabeth Zeller-Powell, 'Defining Biomass as a Source of Renewable Energy: The Life Cycle Carbon Emissions of Biomass Energy and a Survey and Analysis of Biomass Definitions in States' Renewable Portfolio Standards, Federal Law, and Proposed Legislation' (2011) 26 *Journal of Environmental Law and Litigation* 367–434, 374

¹⁰¹ OECD, 'Recommendation of the Council for Agile Regulatory Governance to Harness Innovation' (2021) <<https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0464>> accessed 7 June 2024.

¹⁰² UNFCCC, 'Carbon Capture, Use and Storage' <<https://unfccc.int/resource/climateaction2020/tep/thematic-areas/carbon-capture/index.html>> accessed 7 June 2024.

for countries to achieve their Nationally Determined Contributions through article 6. Consequently, the use of CCS in various countries is likely to increase. Yet, there is no clear and firm regulatory framework or policy guiding safety of utilisation of CCS.¹⁰³ While it is considered important, it poses serious environmental risks, such as leakage.¹⁰⁴ The health and safety risk from CCS can be catastrophic.¹⁰⁵ Nevertheless, the European Union, have established a framework protecting the safety of the environment while utilising CCS.¹⁰⁶

It would seem that a major part of the regulation of renewable energy is still drawn from the traditional regime. While the traditional regulatory regime cannot be abandoned, there would be some deficiencies not envisaged by the draftsmen of the old regulatory framework. For example, it may be argued that the safety regime in oil and gas may to some extent apply to wind but may not fit in all cases.¹⁰⁷ Traditional health and safety laws may not fit to the current realities brought about by energy transition.¹⁰⁸

The way forward is very important that there should be a need for a rethink in the transformation of the health and safety regime of the energy sector. As shown above, energy transition comes with attendant risks. This may give rise to liabilities. Examples can be in worker injuries and fatalities. There are incidents that could result in injuries and death of workers that are common to virtually all forms of renewable energy sources - falls from equipment placed at high heights and electrocution.¹⁰⁹ In biomass

¹⁰³ Ian Havercroft and Ray Purdy, 'Carbon Capture and Storage – A Legal Perspective' (2007) <https://sustainabledevelopment.un.org/content/documents/1486havercroft_paper_legal.pdf> accessed 7 June 2024

¹⁰⁴ Ray Purdy, 'The Legal Implications of Carbon Capture and Storage Under the Sea' (2006) 7(1) Sustainable Development Law & Policy 22-26, 25

¹⁰⁵ Peter Kayode Oniemola, 'Considering Carbon Capture and Storage for the Nigerian Petroleum Industry? Is A Complementary Liability Regime Required?' (2023) 21(3) Oil, Gas and Energy Law Intelligence, <https://www.ogel.org/article.asp?key=4096>

¹⁰⁶ European Union, 'A Legal Framework for the Safe Geological Storage of Carbon Dioxide' <https://climate.ec.europa.eu/eu-action/carbon-capture-use-and-storage/legal-framework-safe-geological-storage-carbon-dioxide_en> accessed 7 June 2024

¹⁰⁷ See E Wifa and TS Hunter, 'Mitigating Occupational Health and Safety Risks in the Proposed Australian Offshore Wind Energy Industry: Lessons from the Safety Case Regime' (2021) 40(1) Journal of Energy & Natural Resources Law 83–104.

¹⁰⁸ A law may become ineffective where it has lost touch with current realities. See Muyiwa Adigun, Babatunde Raphael Ojebuyi, Joshua Akinyemi, Kolawole Wahab, Albert Akpalu, Fred S. Sarfo, Lukman F. Owolabi, Rabiu Musbahu, Abiodun Bello, Reginald Obiako, Mayowa Ogunronbi, Arti Singh, Michelle Nichols, Carolyn Jenkins, Ayodele Jegede, Rajesh Kalaria, Mayowa Owolabi, Bruce Ovbiagele, Oyedunni Arulogun and Rufus Akinyemi, 'Symbolic Legislation and the Regulation of Stroke Biobanking and Genomics Research in Sub-Saharan Africa' (2021) 9(3) The Theory and Practice of Legislation 404, 416.

¹⁰⁹ Vector Renewables, 'The Importance of Safety and Health Activities in Renewable Projects' (12 April 2023) <<https://www.vectorenrenewables.com/en/blog/the-importance-of-safety-and-health-activities-in-renewable-projects>> accessed 6 June 2024.

plants, there could be explosions, fire and exposure to carcinogens.¹¹⁰ In wind and solar energy plants, workers could suffer unfavourable weather conditions.¹¹¹

There are also the occupational health issues. The World Health Organisation defines occupational health to be 'an area of work in public health to promote and maintain highest degree of physical, mental and social well-being of workers in all occupations.'¹¹² Workers in the energy sector are also entitled to good occupational health. However, there are instances where their occupational health suffers. Unfavourable weather and work conditions are some of the issues experienced that could interfere with the occupational health of workers. This is likely to occur on sites that deal with wind, biogas and geothermal resources.

Another can be in connection to public health and safety. Energy transition was a necessary step to curb the damage that the conventional energy sources had done to the public health via pollution of the water, air and land, which has caused many to succumb to various forms of diseases. Notwithstanding the contribution of energy transition in alleviating the risks to public health, there are still concerns that renewable energy could still pose a risk to public health and safety. The energy plants will still make use of machineries that are powered by fossil fuels, which in turn poses a risk of these fuels polluting the surrounding land and water. The machines will also emit fumes that can pollute the air.

In the area of product liability, there are also implications. Manufacturers of any product are required to bear liability for any harm to a consumer caused by a defect or malfunctioning of their products. This liability can also be borne by distributors and retailers of the products.¹¹³ Renewable energy is to a large extent, influenced by weather conditions. As such, bad weather conditions may cause unforeseen damage to facilities and products used on renewable energy sites; this could then cause damage to wind turbines, solar panels and other relevant equipment. The question then arises that in such instances, who would be made to bear the liability? Would it be classified as an act of God which can make manufacturers and insurers avoid liability?

¹¹⁰ Antonio Valenti, Diana Gagliardi, Grazia Fortuna and Sergio Iavicoli, 'Towards a greener labour market: occupational health and safety Implications' (2016) 52(3) *Ann Ist Super Sanità* 415-423, 419.

¹¹¹ *Ibid.*

¹¹² WHO, 'Occupational Health' <<https://www.who.int/health-topics/occupational-health>> accessed 7 June 2024

¹¹³ British Institute of International and Comparative Law 'Overview: UK' (2004) <https://www.biicl.org/files/1123_overview_uk.pdf> accessed 7 June 2024.

5. A CALL FOR REGULATION OF HEALTH AND SAFETY IN THE ERA OF ENERGY TRANSITION: LESSONS AND WAY FORWARD

A legal framework that protects the health and safety of people can help reduce risks as much as possible. The absence of a health and safety regime will enable energy corporations to neglect a proper working system which can have devastating results. A Report published by a BP Independent Safety Review Panel stated that ‘When systems and controls deteriorate, everything can come together in the worst possible way. Equipment malfunctions and controls fail. An explosion and fire occur. People lose their lives or suffer horrible injuries. Families and communities are devastated.’¹¹⁴ Workplace accidents cause a level of loss to families that cannot be measured. It also causes damage to the environment, so, it should be a top priority that a high standard of health and safety are maintained.

The world is currently trying to phase out the conventional sources of energy in order to meet sustainable development goals. While transitioning to the renewable energy sources is good, we do not necessarily have to abandon the old regulatory regime. There are some relevant parts of the old system that could be applied in the new energy system that can help curb the rate of accidents at energy plants.

There should be an international legal response given the pace at which energy transition is going. Since it is largely pushed at domestic fairs, the call for a just energy transition should largely consider the need to address the implications in health and safety. The international community, through the several international organisations, plays a major role in protecting human rights and upholding international law.¹¹⁵ Oftentimes, international organisations set a pace in establishing regulations that their members are obligated to follow. There is a regulatory gap in energy transitioning which may affect the health and safety in this sector. International organisations may bridge this gap by drawing up policies, guidelines or other soft laws that national governments can adopt in updating their energy regulations. The effort of the International Labour Organisation is quite commendable with its Occupational Safety and Health Convention, 1981 (No. 155)¹¹⁶ among other guidelines it has put in place to respond to occupational health and safety issues. Article 2 (1) of the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)¹¹⁷

¹¹⁴ The Report of the BP U.S. Refineries Independent Safety Review Panel 2007 <<http://sunnyday.mit.edu/Baker-panel-report.pdf>> accessed 5 June 2024

¹¹⁵ See Muyiwa Adigun, ‘Legal remedies for energy injustice in the ECOWAS Sub-region: The role of the ECOWAS Court’ (2024) *Journal of Energy & Natural Resources Law* 363, 363-380; Muiywa Adigun, ‘A Human Rights Approach to Climate Litigation before the ECOWAS Court’ 2024 26(1) *Environmental Law Review* 16, 16-32.

¹¹⁶ Occupational Safety and Health Convention, 1981 (No. 155). See also Safety and Health in Construction Convention, 1988 (No. 167).

¹¹⁷ Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187).

provides that '[e]ach Member which ratifies this Convention shall promote continuous improvement of occupational safety and health to prevent occupational injuries, diseases and deaths, by the development, in consultation with the most representative organizations of employers and workers, of a national policy, national system and national programme.' The ILO Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for all 2016, is instructive for states to employ in the development of health and safety in the energy sector in order to accommodate the risk brought by energy transition.¹¹⁸

Article 26 calls on government to consult with social partners to:

(a) conduct assessments of increased or new OSH [occupational safety and health] risks resulting from climate change, resource scarcity or other risks related to human health and the environment, and identify adequate prevention and protection measures to seek to ensure occupational safety and health;...(f) promote the use of appropriate prevention, protection and safety processes and strengthen government capacity to enforce laws at national and subnational level in relation to situations which pose an imminent threat of major accidents or risks; (g) incentivize companies and support technical assistance to conduct research to better understand the range of OSH risks across the life cycle of products, new technologies and jobs, and use this knowledge to improve prevention and safety in the workplace;...(i) regulate and incentivize companies to reduce, minimize, and, where possible, eliminate hazardous materials across the supply chain of products and production processes; (j) assess and define appropriate legislation to ensure that companies take appropriate steps to mitigate adverse impacts on health and safety and, where applicable...

Article 27 also requires the government and social partners to:

(a) include OSH aspects, where appropriate, in certification programmes for sustainability; (b) promote adequate OSH training in green jobs for workers (vocational training schemes and programmes of continuous training in occupational safety and health) and for employers, members of OSH committees and labour inspectors; (c) address the OSH impacts of informality, and facilitate the transition towards the formal economy, in activities related to the greening of the economy, such as materials recovery and recycling,

¹¹⁸ See Lucinda Ponting, 'Managing a Healthy and Safe "Green Industrial Revolution"' (2021) 497 *Health and Safety Bulletin* 5, 6-7.

through training, capacity building, certification and, if necessary, legislation.

The role of domestic law is very important. National governments can enact laws and regulations that establish safety standards in the management and operation of energy plants.¹¹⁹ Such laws may prescribe penalties for non-compliance with safety regulations. Governments may also set up regulatory and monitoring agencies that would enforce the regulations. The regime should account for health and safety as a key consideration for new technologies in energy transition. This implies that the laws should mandate safety standards for deployment of new energy technologies such as wind turbines, solar panels, and electric vehicles. The new technologies should be made to meet rigorous safety and health criteria adopted, considering best practices. In the areas of environmental impact assessments, the legislation should be made to make comprehensive environmental impact assessment for new energy projects to assess their potential effects on health and safety. For example, the laws will provide that emissions and pollutants from new energy facilities are addressed ensuring they do not adversely affect air and water quality. There should be provisions for emergency response and preparedness. Thus, the laws should make it compulsory that there should be a plan for emergency response for incidents related to energy transition projects from chemical spills or accidents at renewable energy sites etc.

Engaging the community is important as persons within the communities are most likely to be affected by the project. The process of engaging local communities in decision-making should be expressly spelt out. This will ensure that concerns and needs of affected persons are considered. There should also be arrangement for public awareness and education. The legal regime can provide for promotion of public awareness campaigns and educational programmes about the health and safety aspects of energy transition. Individuals and communities are offered opportunities to understand and manage potential risks. Domestic law can make provisions that support funding and incentives for research and development into safer and more sustainable energy technologies, thereby leading to avenues for innovations that further enhance health and safety during the energy transition.¹²⁰ Regulatory compliance and enforcement are critical to the overall regime on health and safety. The effective enforcement mechanisms are essential for ensuring compliance with health and safety regulations. New regulatory bodies or reform of the existing ones can be provided in the law with the authority to monitor, inspect, and enforce compliance. In any event,

¹¹⁹ Bradbrook, 36.

¹²⁰ Peter Kayode Oniemola, 'Integrating Renewable Energy into Nigeria's Energy Mix through the Law: Lessons from Germany' (2011) 2(1) *Renewable Energy Law and Policy Review* 29, 32; Peter Kayode Oniemola, 'Legal Response to Support Renewable Energy in China' (2014) 32(2) *Journal of Energy & Natural Resources Law* 179, 194.

safety regimes should avoid institutional overlaps and promote cooperation to achieve the desired regulation.¹²¹

One good thing about energy transition is that it is contributing to sustainable development and thus potentially making lives and the environment safe and better. It would, then, be contrasting if this “good thing” also puts the health and safety of people at risk just as the fossil fuel industry did. This must be avoided as much as possible. It may be inevitable that a couple of accidents and other forms of work-related disasters are likely to occur even in the course of energy transition. However, it is vital that appropriate steps are taken to reduce these accidents to the barest minimum.

The world is not yet fully reliant on renewable energy as it is still transitioning. Research is still ongoing and new discoveries about renewable energy are still emerging. An implication of this is that many of the existing policies and regulations made for the industry may become ineffective. This may not be a challenge if every country has a functioning body like the U.S. National Institute for Occupational Safety and Health, with the primary objective of recommending regulations as needed to ensure the safety and health in the work environment. Going forward, it is recommended that the legal framework of the energy sector should include the establishment of a similar body or agency.¹²² This would ensure that there are matching regulations for every level of development in energy transition.

The implementation of health and safety regulations may be weak when it comes to renewable energy. The main focus tends to be on the development of renewable energy and its benefits. It would seem that renewable energy is assumed to be a safer source of energy and thus, does not warrant the multiple safety regulations that exist in the conventional energy industry. This should not be so. There should be just as many regulations as are required with implementation schemes to enforce adherence. As stated earlier in this paper, the level of risks that may arise in energy transition cannot yet be ascertained. It would then be dangerous to demonstrate laxity in ensuring the safety of people using and working around renewable energy sources.

6. CONCLUSION

Health and safety have been a critical challenge in the energy sector. Particularly in the past, there have been notable cases that have called for the development of legal regimes to address health and safety in the fossil fuel industry. With the move towards energy

¹²¹ See Danielle L. Ornelas, Pietro AS Mendes, Alessandra Magrini, and Mauricio C. Arouca, ‘Offshore Oil and Gas Exploration and Production in Brazil: A Proposal for Integrated Actions for Operational, Occupational and Environmental Safety’ (2014) 1(4) *The Journal of World Energy Law and Business* 340, 346.

¹²² On the complexity of the forms that the legal framework may take, see Muiyiwa Adigun, *The International Criminal Court and Nigeria: Implementing the Complementarity Principle of the Rome Statute* (Routledge 2018) 56-81.

transition, new health and safety issues are raised because of the deployment of energy transition technologies. This article has examined the issues that need to be addressed in the energy transition today. While the world is transitioning to various alternative energy sources and energy efficiency technologies for a cleaner future, the issues of health and safety need to be closely scrutinised. There is, however, a need for a shift to consider the implications of the energy transition on health and safety in the energy sector. Health and safety risks have huge implications for liability. The development that supported the fossil fuel sector and the general workplace health and safety models may not meet current realities. There is a need to address these implications and ensure that laws are put in place to address the likely health and safety issues that may arise from the deployment of energy transition technologies.