

EXAMINING THE NEED TO REGULATE HEALTH, SAFETY AND ENVIRONMENTAL, (HSE) CONCERNS OF OFFSHORE WIND ENERGY DEVELOPMENT IN THE UNITED KINGDOM*

Abstract

There is a yearning need to investigate the health, safety and environmental considerations sequel to the establishment of the recently developed offshore wind energy development in the United Kingdom. This study thus seeks to examine the regulation of the health, safety and environmental challenges of the recent offshore wind development in the United Kingdom with a view to exporting the knowledge and lessons gathered to emerging economies desirous of exploring renewable energy options. This paper's methodology is strictly analytical and largely library-based. It relies heavily on information in legislations, parliamentary reports, articles and books on health, safety, environmental and planning law in offshore wind energy developments and its regulation. It was found that an inadequate response to the health and safety challenges of wind energy development at the outset will not just have an adverse effect on individual projects, but it would affect the entire future of offshore wind development in the examined jurisdiction. This paper concludes by recommending that those in charge of HSE concerns for offshore wind energy development should do more in terms of promoting awareness regarding health, safety and environmental concerns in offshore wind energy operations.

Keywords: Health, Safety, Environment, Occupational, Renewable, Wind, Energy.

1.0 General Introduction

According to the statistics of the International Energy Agency (IEA), by the year 2022, Global Renewable Energy generation is expected to grow by over one-third to over 8000 terawatts per hour, equal to the total power consumption of China, India and Germany combined¹. The renewable energy sector at present employs nearly 9.8 million people worldwide in different stages of renewable energy production². As the renewable energy industry continues to grow, it is expected that new challenges would also begin to spring up. With an increasing number of workers now employed in various aspects of the sector, Occupational Health and Safety become a prime concern. While it has been suggested that renewable energy production may result in fewer occupational injuries and fatalities than fossil fuel extraction and processing,

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¹Data and Statistics- IEA. Total Energy Supply and Consumption. <<https://www.iea.org/data-and-statistics>> Accessed 11th March, 2021.

²*Ibid.*

each type of renewable energy production process has been contended to present unique occupational hazards in construction, operation, and maintenance of the facilities³. Given the case, renewable energy sector can safely be stated as not possessing any industry-specific standards and indicators for Occupational Health and Safety. Research on worker safety, particularly long-term occupational health effects, in renewable energy industries is thus limited. Worker safety standards and indicators are often mostly based on experience from other industries that are assumed to have similar hazards.

The offshore wind industry in the UK is relatively new and it brings regulatory challenges of its own. As wind farms move further away from the shore and into deeper water, a number of issues relating to health and safety will need to be addressed.⁴ Just as regulation played a significant role in securing health and safety in the offshore oil and gas sector on the United Kingdom Continental Shelf,⁵ so also is appropriate regulation required to attain high health and safety standards in the novel offshore wind energy industry.⁶ Another issue close to the Health and safety regulation of offshore energy development in the United Kingdom is the environmental concerns which this paper hopes to also address. This is intended to be undertaken by principally identifying the health, safety and environmental challenges facing offshore wind energy development in the United Kingdom and analysing whether the prevalent laws governing and regulating it promotes or stalls the offshore wind energy development.

Even though the three-fold dimensional but related concepts of Health, Safety and Environment, HSE is posited to be woven together in this paper, they are somewhat discussed separately in different paragraphs in order to aid comprehension. One other novel twist to it is that this research aims to link the third arm of the HSE, environment to maritime spatial planning as it will embark on a research to determine how the legal framework for marine planning work in addressing the environmental challenges of offshore wind development.

Thus, if the offshore renewable energy development is not to experience the catastrophes that plagued the United Kingdom's offshore oil and gas industry (as evidenced in the Sea Gem accident and the Piper Alpha accident) before the present 'per missioning/goal-setting/safety' case regime was put in place, the government must take adequate steps to ensure that prompt and efficient regulation for securing health and safety in offshore wind energy developments are in place before its massive take-off.

This paper focuses on examining the UK's regulatory regime governing health, safety and environmental concerns in offshore wind energy developments, the Marine and Coastal Access Act 2009- an Act that makes provision in relation to marine functions and activities, and which

³N. Elakiya Priya, 'Sustainability Management and Occupational Safety Considerations in Renewable Energy Developments'. (2015) Xavier University Bhubaneshwar Memo Notes. P. 2.

⁴ Chris Lawson, 'Health, Safety and Offshore Wind Energy', Magazine for the Offshore Wind Industry Vol II, No 1 January 2011, 31.

⁵ John Paterson, 'Health and Safety at Work Offshore' in Greg Gordon, John Paterson and Emre Usenmez (eds) *Oil and Gas Law: Current Practice and Emerging Trends* (2nd edn, Dundee University Press 2011) 187.

⁶ Lawson (n 1) 31.

seeks to improve the management and increase the protection of marine environment⁷. Section 1 of the climate Change Act 2009 for instance which imposes a legally-binding target to reduce carbon dioxide emission to 20% of the 1990 levels in Scotland by 2050 and the Marine Scotland Act and which established the Marine Scotland, a body which has used a marine planning approach to develop a sectoral marine plan for Offshore Wind in Scottish territorial waters that will be integrated into an emerging marine planning framework is examined with a view to determining the level of hazardousness posed by offshore wind development in the United Kingdom.

The development of offshore wind as a renewable energy resource is predominantly Scotland-based as Scotland is a wind fountain which is able to pursue more ambitious goals in these matters because the Scottish government operates as a devolved government within the United Kingdom where responsibilities are divided for various aspects of energy policy and regulation but overall energy policy is reserved to the central UK government. This is hoped when fully developed without hitches, can be transposed to other developing countries like Nigeria and other parts of Africa with huge potentials and resource for wind energy and other alternative sources of energy.

This paper analyses and exposes the present regulatory framework to identify gaps and areas where more needs to be done to ensure more efficient health, safety and environmental standards in offshore wind energy developments. It considers whether a goal-setting regulatory regime or a prescriptive regime would be suitable for the emerging industry, but avers that because it is a newly emerging energy development which has not been largely tested, a prescriptive regime is hereby advocated as more appropriate, but industry-specific regulations are equally billed necessary. It is therefore hoped that as offshore energy development climaxes in the United Kingdom, it would consciously draw on experiences in the offshore oil and gas industry and the marine/shipping industry for optimal performance, whilst avoiding the pitfalls of those related industrial activities and developments. It is thus stated that inappropriate and incomplete payment of attention to issues of health, safety and environment in offshore wind developments has a negative impact on the overall development of offshore wind energy in the United Kingdom.⁸ It is equally argued that safety in the novel offshore wind energy developments need not follow a ‘bathtub curve’⁹ before the proper way of doing things right is attained, considering the United Kingdom’s experience in regulating other offshore industries. However, it should be not be assumed that replicating this experience in offshore wind energy developments would be an easy challenge but it is contended that the replication of the ways of dealing with the health, safety and environmental concerns of the United Kingdom’s offshore industry in sundry and kindred areas like the oil offshore decommissioning projects would definitely be a plausible avenue to develop this novel offshore wind energy development

⁷ Marine and Coastal Access Act 2009.

⁸*Ibid.*

⁹Eirik Albrechtsen, ‘Occupational Safety Management in the Offshore Wind Industry – Status and Challenges’ *Energy Procedia* 24 (2012) 313.

on the strengths and weaknesses of similar developments which gives a wide room for plausible comparative advantage.

2.0 Significance of the Paper

This paper is important because offshore wind energy development is a major focus of the UK government especially in the light of climate change mitigation, electricity market reform and a transition to a low carbon economy. With the increase in offshore wind energy development activities, the potential for accidents involving workers would increase. This potential for accidents needs to be taken into account and addressed through appropriate regulation to ensure safety of personnel. This is because regulation plays a critical role in defining the requirements for health and safety for offshore wind energy developments.

3.0 Institutional Overview of Renewable Energy Development in the United Kingdom

Renewable energy is often touted as one of the top solutions to climate change.¹⁰ Thus, large investments in energy generation from wind, wave and tidal energy sources is firmly on the agenda of the United Kingdom's government.¹¹ The United Kingdom was equally subject to a legally binding European target to obtain 15% of its energy requirements (heat, electricity and transport) from renewable technologies by 2020¹². Whether this projection has been achieved even in the year 2021 remains to be seen. As far as the government is concerned, the United Kingdom's renewable energy is so vast that far-reaching measures to unlock this great potential are absolutely necessary on one hand, whilst the need to address deleterious effect of the exploration also remains an issue of concern to stakeholders.¹³ It is interesting to note that this is coming at a time when the melodious song of electricity market reform promising a transition to a low-carbon economy is sweeping happily, albeit menacingly and through the foul air of national consciousness.¹⁴

This is particularly so, because in the wake of the maturity of the UK's oil and gas province characterized by declining production, small new fields and increasingly less acreage to be let, renewable energy generation became regarded by the United Kingdom as a solution to its energy security concerns.¹⁵ It seems to be an all-in-one package solution that will not only solve the lingering problem of energy security, enhance its economic development through more job creation, but will equally help in 'reviving' the dying earth by embracing the use of this low carbon, sustainable, clean, healthy, safe and environment-friendly energy resource. Renewable energy development, particularly offshore wind is therefore billed and hoped to create lasting employment, lead to more development, manufacturing, increase energy

¹⁰ Department of Energy and Climate Change, (DECC) 'UK Renewable Energy Roadmap' July 2020.

¹¹ *Ibid*, 9.

¹² Department of Energy and Climate Change, (DECC) 'UK Renewable Energy Roadmap' July 2020.

¹³ *Ibid*.

¹⁴ *Ibid*, 10.

¹⁵ Department of Trade and Industry, 'Offshore Wind Energy: A UK Success Story', 5

efficiency, ensure the promotion of energy security as well as guarantee the export of energy expertise, power and equipment to the rest of Europe and the world¹⁶.

Therefore, the United Kingdom target whereby renewable energy ought to account for 15% of its energy needs by 2025;¹⁷ is deemed realizable by exploring its offshore wind development potentials, thus, the major focus of this paper is to explore how combatting the challenges of this energy development would play a major part in meeting this set target. It is instructive to note that the United Kingdom was chosen as a jurisdiction of study in this paper largely because the United Kingdom is a sovereign state, even though Scotland is a component part which incidentally is the global leader for offshore wind energy with 1.3 gigawatt of operational capacity across 15 wind farms.¹⁸ Notably, offshore wind energy developments will be used to generate electricity and it is estimated to have the potential to produce 30 gigawatts by year 2030, enough to power all the homes in the United Kingdom.¹⁹ It is hereby noted that since wind is free and a non-exhaustible resource, and as a wind island, Scotland, which is part of the United Kingdom is uniquely well positioned to take advantage of it.

As glowing and seemingly bright the picture of its renewable energy potential painted above is, a major gap in the development of offshore wind energy is a lack of adequate consideration of, and attention to the impact of offshore wind energy developments on the health and safety of workers on one hand and the deleterious environmental implication of offshore wind development on the other hand. It is therefore important to note that the challenges of health, safety and environmental impact of offshore wind development receive far less attention of the law, the formulation of policies and international attention than the issues of climate change mitigation, economic development, public participation, socio-political considerations and objection and energy security. It was in this guise that Chris Lawson noted that ‘an inadequate response to the health and safety challenges at the outset will not just have an adverse effect on individual projects: it could affect the entire future of offshore wind development.’²⁰ Similarly, the environmental impact and effect on the short and long term basis, especially because offshore wind development is a relatively novel development in Scotland and as such, the full extent of its environmental impact cannot be fully determined at this level, only a safe projectional estimate of the cost of impacts could be reasonably made. It is hoped that this paper stirs up this consciousness and hopes to fill this yearning gap as more developments abound.

In a similar vein, the United Kingdom government is focused on increasing sustainable economic growth, improving economic performance while reducing the impact on society and the environment. This paper seeks to examine how the law can be used to achieve these

¹⁶ “Regulations and Best Practices Addressing Unique Offshore Wind Farm Worker Safety and Health Hazards.” Transportation Research Board. 2013. Worker Health and Safety on Offshore Wind Farms - Special Report 310. Washington, DC: The National Academies Press. doi: 10.17226/18327.

¹⁷ DECC, (n 6) 9.

¹⁸ *Ibid*, 42.

¹⁹ *Ibid*, 44.

²⁰ Lawson, *supra*.

objectives. One prominent way that law proposes to employ in addressing the environmental effects of offshore wind energy development is through Planning and licensing processes²¹. It is contended and projected that the planning and licensing processes would work well to address the identified environmental effects of offshore wind development in the coming years.

Furthermore, the role of the Marine Policy Statement (MPS) which is an important policy document and a framework for preparing marine plans, taking decisions affecting the marine environment and realizing its aim including achieving the sustainable development of the United Kingdom area cannot but be explored, if a purposive and effective regulation of the health, safety and environmental concerns of offshore wind energy development in the United Kingdom would be engendered²². It is therefore noted that the Marine Policy Statement, MPS contains a detailed examination of how environmental problems caused by offshore development could be dealt with in planning and in licensing (both when they are known and in cases of uncertainty). It is however hoped that as offshore wind development goes on, the extent of its effectiveness would become determined and studies like this would bring to the fore how law can be used to address the environmental effects of offshore wind development in the United Kingdom and suggest functional legal recommendations in the event of a discovery of its ineffectiveness. The uncertainty of the environmental effect which is an integral part of the ineffectiveness is equally hoped to be addressed through more research and enhanced stakeholder participation.

4.0 Assessing the Health, Safety and Environmental Challenges of Offshore Wind Development

A notable renewable energy scholar asserted that considerable health and safety challenges exist in the offshore wind industry²³. These challenges include: managing the risks of deep water, heavy lifting operations, suitability of vessels, structural integrity of wind turbines and other support structures, workforce competence and working from heights.²⁴ Similarly, RenewableUK highlights the need for proper management of risks of fire, electrocution, slips and trips as well as contact with moving machinery.²⁵ It is however noted that these challenges and risks are present during construction, installation, operation and management of wind turbines.²⁶

Lawson thus further opined that legislation has a critical role to play in offshore wind energy development, pointing out the difficulty involved in adapting present legislation, specifically the Construction Design and Management (CDM) Regulations 2007, to the marine

²¹ S. A Jay, 'Planners to the Rescue: spatial planning facilitating the development of offshore wind energy', (2010) 60 *Marine Pollution Bulletin* 493.

²² <<http://www.gov.uk/...uk-marine-policy-statement.pdf>> 'The UK Marine Policy Statement 2011'.

²³ Chris Lawson, 'Health, Safety and Offshore Wind Energy', *Magazine for the Offshore Wind Industry* Vol II, No 1 January 2011, 31.

²⁴ *Ibid.*

²⁵ Renewable UK, 'Safety & Emergency Response in Offshore Wind: Changes Arising from Offshore Renewable Energy Activity for Sea Use Within the United Kingdom Search and Rescue Region', November 2011, 3.

²⁶ Peter Atkinson, 'Securing the Safety of Offshore Wind Workers', *Renewable Energy Focus*. 2010, 34.

environment.²⁷ He also noted the need for legislation to catch up with the speed of development in the offshore wind industry and for the industry to take a proactive approach to interpreting legislation in the meantime.²⁸

In 2006, the HSE's report on The Health and Safety Risks and Regulatory Strategy Related to Energy Development described offshore wind farm construction as 'a relatively simple operation, with turbines being of modular construction to facilitate rapid installation.'²⁹ It stated further that the health and safety risks in the offshore industry are relatively low risk compared with the major hazard nature of offshore oil and gas,³⁰ concluding that the existing health and safety regulatory arrangements are sufficient to deal with energy production from offshore wind energy.³¹

Peter Atkinson in his own work criticized the 'expert' report as a revelation of HSE's current superficial level of knowledge and understanding of the [offshore wind] industry.³² He noted incisively that the report makes no mention of risks associated with diving, electrocution, underwater hazards and evacuation from tower platforms in the event of a fire,³³ or how the HSE intends to work alongside other agencies regulating maritime activities which form an integral part of the installation and operation of wind turbines in the United Kingdom energy industry.³⁴ Atkinson further points out that recent experience of the industry shows that the HSE's view was over simplistic and failed to take into consideration the complexities of the operations of wind energy developments.³⁵

Atkinson considers that novelty of some offshore wind industry practices will require both regulators and those working in the industry to pick up valuable lessons as offshore development increases, build up experience and then develop a regulatory framework to match the peculiarities of the industry to ensure the utmost preservation of workers' safety.³⁶

In a related manner, as far back as year 2011, Renewable UK, the prime professional body for wind and marine energy in the United Kingdom admitted 1500 wind energy accidents and

²⁷ Lawson, *supra*.

²⁸ *Ibid*.

²⁹ Health and Safety Executive, 'The Health and Safety Risks and Regulatory Strategy Related to Energy Development' An expert report by the Health and Safety Executive contributing to the Government's Energy Review, 2006, 49.

³⁰ *Ibid*, 50.

³¹ *Ibid*, 51.

³² Atkinson, *supra*.

³³ *Ibid*.

³⁴ *Ibid*.

³⁵ Renewable UK, Guidelines for Onshore and Offshore Wind Farms: Health and Safety in the Wind Energy Industry Sector, Issue 1, 2010.

³⁶ ASTM F1166-2007—Standard Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities (Section 18.4).

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incidents in the preceding five years, including four deaths and a further 300 injuries to workers;³⁷ a figure representing almost a staggering incident of one accident per day.³⁸

It is equally noted that the Crown Estate, responsible for granting licenses for offshore wind developments, recognizes that offshore is a hazardous environment making health and safety a key concern as increasing move into deeper waters could exacerbate hazards.³⁹ It went further to identify a number of high risk offshore wind energy operations that need to be addressed in order to secure health and safety.⁴⁰

In contrast to the HSE's claim in the year 2006 and as stated above, the HSE conceded many years later that the current regulatory regime for emerging energy sectors (including offshore wind energy) was not 'fully fit for purpose'.⁴¹ Put differently, it cannot deliver the standard of safety required to match the risks in the offshore wind energy industry. However, it sees as necessary for safety, a reform package (directed specifically at the industry) where regulatory reform would involve, not a new regulatory approach but the extension and adoption of familiar regulatory approaches to new situations.⁴²

The HSE further admitted, albeit in another document, that the scale and speed spurred on by the drive towards a new energy economy will, from a health and safety perspective, pose a significant challenge.⁴³ And this challenge is further complicated by the fact that the crucial first step towards managing and controlling hazards and risks, namely: the fact that identifying these hazards and risks, are not straight forward in an industry such as the offshore wind industry with its attendant novel technologies.⁴⁴ In this regard, it points out a lack of safety data on wind farm turbine failures that can be used in risk assessment.⁴⁵

The HSE, noting the need for an effective regulatory system that would deliver the goods in the offshore wind industry, stated that it aims to develop a supportive regulatory framework whilst promoting a sensible management and control of hazards and risks.⁴⁶ However, it would start out with the presumption that 'further regulation would not be required unless it becomes obvious that current regulation is insufficient or that lessons could be gleaned from more advanced jurisdictions.'⁴⁷ Thus, it would rely on the Health and Safety at Work (etc.) Act 1974

³⁷Edward Malnick and Robert Mendick, '1,500 Accidents and Incidents on UK Wind Farms', The Telegraph, 11 December 2011.

³⁸Atkinson, *supra*.

³⁹The Crown Estate, 'Offshore Wind Cost Reduction: Pathways Study' 61.

⁴⁰*Ibid.*

⁴¹Health and Safety Executive, 'An Update on the Emerging Energy Technologies Programme' April 2010, 2.

⁴²*Ibid.*

⁴³Health and Safety Executive, 'Health and Safety in the New Energy Economy: Meeting the Challenge of Major Change', 15 December, 2010, 8.

⁴⁴*Ibid.*

⁴⁵ASTM F1166-2007—Standard Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities (Section 18.4).

⁴⁶*Ibid.*

⁴⁷AWEA, Recommended Practices for Design, Deployment, and Operation of Offshore Wind Turbines in the United States (2012) 35.

as the basis for a fit-for-purpose regulatory framework.⁴⁸ It adds that additional regulations may be put in place where clear and compelling evidence proves that the scope of the Act is insufficient.⁴⁹ Against the above background, this paper can categorically theorize that an additional regulation would be necessary to effectively administer offshore wind energy and the extant regulatory regime should also urgently be made ‘fully fit for purpose.’

It is instructive to note that there are a number of environmental impacts of offshore wind development in the United Kingdom and beyond and the law should hence be used to address these environmental effects. There are equally several contentions raised against renewable energy development ranging from biological conservation to visual or aesthetic pollution-which naturally militate against offshore wind energy operations. For instance, electromagnetic forces from cables for transmitting energy can disturb species sensitive to them, (for example eels)⁵⁰. There are also acoustic effects, in that there is a significant effect of the noise in areas such as the strategic development zones in the seas of northern Europe, as the cumulative effect of the construction of multiple offshore wind turbines has been held to likely to render a large area unfavourable for species that react to the noise whilst many flight birds are caught dead upon their collision with turbine blades. Of a fact, offshore wind farm-generated power in Scotland⁵¹ has been adjudged to be inefficient, intermittent, noisy and a major cause for visual pollution. It was in this wise that famous American Billionaire and former United States of America President, Donald Trump described offshore wind energy development as an ‘ugly industrial park’ as he contended that it disturbs the aesthetic value and good view from his international golf course and menie estate in Scotland⁵².

Apart from these itemised challenges, there is a perceived anthropogenic underwater noise impact on fish and marine mammals, even though there is yet no test for determining the impact of noise on other organisms like crustaceans.⁵³ There is also evidence from Danish studies that marine mammals respond by moving away from an area where offshore wind turbine construction is taking place. Study has also revealed that some animals could also be attracted to the produced noise, resulting in other unknown effects like entanglement or area restricted movement⁵⁴.

Furthermore, research has shown that devices with subsurface moving parts like underwater turbines and hydroplanes are usually assumed to be the noisiest; however, there is no data yet

⁴⁸*Ibid.*

⁴⁹*Ibid.*

⁵⁰ G.W Boehlert and A.B Gill, 'Environmental and Ecological Effects of Ocean Renewable Energy Development: A Current Synthesis', (2010) *Oceanography* Volume 23, @ 2.

⁵¹<<http://www.offshorewind.biz/2012/23>> Accessed 08 November, 2016.

⁵² Donald Trump halts Golf Course Construction due to ‘Ugly’ Wind Farm. <<https://www.wind-watch.org/news.com>> Accessed 15th March, 2021.

⁵³Sue Kidd, *et al*, ‘The Ecosystem Approach and Planning and Management of the Marine Environment’ in Sue Kidd, Andy Plater and Chris Frid (eds), *The Ecosystem Approach to Marine Planning and Management* (Earth scan 2011).

⁵³*Ibid.*

⁵⁴ G.W Boehlert and A.B Gill, 'Environmental and Ecological Effects of Ocean Renewable Energy Development: A Current Synthesis', (2010) *Oceanography* Volume 23, @ 2.

to quantify the amount of noise produced or the extent of its impact. Other ecosystem challenges include the fact that Seabirds and migratory birds are of also of great concern as there is interference between large turbines and seabirds, water fowl and other rare species like common scoter and red-throated diver. It is imperative to state that the Royal Society for the Protection of Birds, RSBP's former manager for North East Scotland, Mr Ian Francis and the current Regional Director, Andy A Bunten separately raised the issue of threat to wildlife as part of the dangers of offshore wind energy development.⁵⁵

There is also the fact that moving parts of marine renewable devices like turbines can lead to "blade strike" typically viewed as a problem with migratory birds and wind energy devices⁵⁶. Energy removal by devices in water as well as blockage effects, can similarly lead to localized changes in water movement energy and turbulence, whilst these changes, in turn, can cause benthic sediment scouring and resultant habitat changes. This allegedly occurs largely because the energy withdrawn from air, water or waves may also have potential effects in both near- and far-field scales⁵⁷. Offshore wind farm devices operate by removing kinetic energy from air whilst for devices at sea or in estuaries, the resultant reduction of energy may lead to downstream effects⁵⁸. Shadow effects of wave energy devices may alter sediment transport and deposition as well as have an effect on beach processes⁵⁹. It is therefore hoped that this paper and similar researches in future will bridge the gap, resolve some of these lingering challenges and examine how health, safety and environmental law can be used to resolve these and other yet to be identified health and environmental impacts of offshore wind energy development in the United Kingdom and elsewhere.

It is imperative to consider other jurisdictions apart from the United Kingdom in order to have a glimpse of obtainable procedure. In Malaysia for instance, according to the Occupational Health and Safety Administration (OSHA), the hazards in the renewable energy sector are deemed not unique and OSHA has many standards that cover them. For instance, the Electrical hazards in solar and wind energy are readily covered by OSHA's Work Hazards and Safety Practices in the Electric Power Industry.⁶⁰ But there also exists some unique risks that are sector-specific. This argument can be justified by considering the following situations:

1. Unlike conventional energy plants, renewable energy plants are not geographically bound and inaccessible by the public. So the risk to the public is a major factor in the Occupational Health and Safety, OHS of renewable energy.
2. There exists a certain risk owing to the operation in challenging areas. Renewable energy plants are largely located in extreme conditions such as

⁵⁵ "Living seas", <<http://www.scottishwildlifetrust.org.uk>> Accessed 25th March, 2021.

⁵⁶ K Johnson, et al, 'Accommodating Wave and Tidal Energy- Control and Decision in Scotland, (2012) 65 Ocean and Coastal Management 26.

⁵⁷ *Ibid.*

⁵⁸ *Ibid.*

⁵⁹ *Ibid.*

⁶⁰ N. Elakiya Priya, 'Sustainability Management and Occupational Safety Considerations in Renewable Energy Developments'. (2015) Xavier University Bhubaneshwar Memo Notes. P. 2.

isolated, remote, difficult-to-reach areas and extreme weather conditions⁶¹. It is noted however that the hazards under such situation can be more severe and very different from the conventional energy industries.

3. There exists a high chance of occupational risk due to the transportation of workers to challenging areas which are often not well defined particularly in offshore wind developments, especially at the commencement of the operations.
4. There is also the challenge of potential risks for both the personnel and the general public such as turbine collapse, Wind blade breaking, air contraction, etc.

It should equally be stated that because there is yet limited research in Occupational Health, Safety and Environmental, OSHE concerns of renewable energy, there can equally be unidentified risks. It is therefore noted that it is because of the prevailing situation, that world leaders in renewable energy production and distribution have tailored the HSE system that best suits their requirement for mitigating risk and increasing efficiency⁶². These systems that organisations follow include the Occupational Health and Safety indicators used in general by similar sectors as well as industry-specific indicators and risk prevention activities. Also, organisations like International finance corporation (IFC) and Global Wind Organisation (GWO) recommend indicators using which Occupational Health and Safety can be quantified and assessed in order to identify the risk involved.

5.0 Concluding Remarks

In conclusion, this paper has successfully awoken the consciousness of critical stakeholders in the United Kingdom energy sector and indeed anywhere desirous of heralding a workable offshore wind energy development on the health and safety risks associated with it by highlighting the regulatory framework in place in the UK for securing health and safety of both man and animals in the ecosystem and how it can be better made fit for purpose. It suggests that it is absolutely necessary to put in place industry-specific regulations in order to secure health and safety in offshore wind farms as the development takes shape and that there are valuable lessons to be learnt from the regulation of health, safety and environment in the offshore wind industry of the United Kingdom by developing and emerging economies. It is noted that since the offshore wind farm industry is relatively new with new players in the offshore arena and duty holders who have little experience in health and safety management; a prescriptive approach appears the right approach for achieving the promotion of HSE concerns in the industry, especially as the permissioning regime obtainable in the United Kingdom is deemed necessary to secure safety in the offshore wind industry.

It is thus recommended that those in charge of HSE concerns for offshore wind energy development should do more in terms of promoting awareness regarding health and safety on

⁶¹Sue Kidd, *et al*, 'The Ecosystem Approach and Planning and Management of the Marine Environment' in Sue Kidd, Andy Plater and Chris Frid (eds), *The Ecosystem Approach to Marine Planning and Management* (Earthscan 2011).

⁶²*Ibid*.

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one hand and reducing environmental impact in offshore wind farms on the other hand. It is advocated that incentivisation should be encouraged to stimulate duty holders and other critical stakeholders to regard safety as a priority; cost reduction initiative which is being promoted by the Crown Estate should be sustained; structural integrity in offshore wind farms should be promoted; health safety and environmental measures required to address the future issue of ageing and life extension of offshore wind energy turbines must be entrenched and a comprehensive, industry-specific marine spatial planning framework effective for addressing the identified environmental effects of renewable energy development in the United Kingdom as well as other renewable energy jurisdiction should be evinced.

Further and better research that would see to more collaboration between law and marine science in order to address the environmental impact of offshore wind development especially at this novel development stages and the willingness of the offshore wind industry to learn from the onshore wind energy sector and the offshore oil sector is advocated on one hand and the process of making the marine planning and licensing regimes of the United Kingdom viable tools for effectively addressing the environmental impact of offshore wind development is desired on the other hand.

Lastly, an optimal range of valuable knowledge in Occupational Health, Safety and Environmental issues in the renewable energy sector that would take into cognizance Safety Audit Awareness program, otherwise (Safety Walks), safety drills, training executive officers for leadership habits in Occupational Risk Prevention; medical treatment and immunization; fatality rate; public fatality rate; incident severity rate; on route accidents and on mission accidents is hereby desired.