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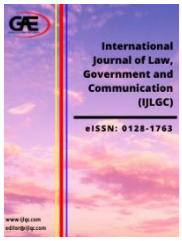

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LEGAL INSIGHTS OF OCEAN THERMAL ENERGY CONVERSION LAWS: PAVING THE WAY FOR SUSTAINABLE ENERGY

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Abstract:

Given the world ever growing populations and endless struggles for energy acquisitions leading to geopolitics activities and wars, the dire need for an alternative renewable energy production is no longer an option but a must. The development of ocean Thermal Energy Conversion (OTEC) as a form of renewable energy are steadily becoming a reality with many nations gearing for actual commercialisation plants which principally is for financial gain. However, since all the current OTEC projects are at the research and development stage, there is a need to investigate whether the respective nations are ready with the necessary provisions of law, be it by using the available renewable energy law or towards creating a specific law on OTEC itself. This article looks to review at the current progress of research on OTEC development by studying the laws of these countries and determine the legal readiness in implementing OTEC commercial development.

Keywords:

Ocean Thermal Energy Conversion (OTEC), Renewable Energy Law, Legal Readiness, Sustainable Energy Development

Introduction

The global energy landscape continues to face significant challenges and concerns in meeting the rising demand for energy across industrial, commercial, and household sectors. Projections indicate a 37% growth in world energy demand from 2013 to 2035 (British Petroleum, 2022), emphasizing the urgency to explore alternative energy sources. While some nations, such as

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the United States, consider re-embracing traditional energy sources like coal and withdrawing from global initiatives like The Paris Agreement, such approaches are deemed insufficient for addressing climate change and escalating energy demands.

Renewable energy, derived from naturally replenishing and sustainable resources, stands as a crucial solution to the environmental impact of finite fossil fuels. Sunlight, wind, rain, tides, waves, geothermal heat, and ocean thermal energy represent sources with minimal environmental consequences. One promising form of renewable energy is Ocean Thermal Energy Conversion (OTEC), a technology that exploits the temperature difference between warm surface ocean water and cold deep water to generate electricity.

As of 2022, OTEC technology has advanced, demonstrating its potential to produce continuous and reliable renewable energy. Notably, OTEC is particularly effective in tropical and subtropical regions where significant temperature differences in the ocean prevail. The OTEC process involves using warm surface water to vaporize a working fluid, usually ammonia, and utilizing the resulting gas pressure to drive a turbine, generating electricity. The cold water from ocean depths then condenses the working fluid, completing the cycle.

Beyond electricity generation, OTEC offers additional benefits in various upstream and downstream activities. These include the production of drinking water, aquaculture, marine culture, air-conditioning, cultivation of temperate produce at sea level, and the extraction of resources such as lithium and ammonia. The broader socioeconomic impact is evident, influencing economic activities across diverse sectors (Anastasopoulou, Wang, Hessel, & Lang, 2014; Banerjee, Nor Musa, & Bakar Jaafar, 2017; Edenhofer et al., 2022; Finney, 2008; Marziah, Azhim, Mahdzir, Musa, & Jaafar, 2015).

While OTEC presents a promising avenue for addressing energy and climate challenges, issues related to administration, licenses, permits, enforcement, grants, rights, concessions, and fees must be carefully navigated to ensure the successful development and deployment of this innovative technology in the year 2022 and beyond. This also involve issue of taxation, zoning, royalties, commissioning, installation, monitoring, safety, security, management, decommissioning and abandonment are real issues which must be taken into considerations (O'Hara, 2017).

Accordingly, these concerns trigger the creation of laws and order to ensure accountability, stability and safety for those who are involved and affected. Commercialisation of OTEC technology would only be practical when financial gain is secured (Patel, Patel, Ram, Jatav, & Xaxa, 2015; Plocek, Laboy, & Martí, 2009; Vega, 1992). In other words there is a need to have a sustainable development law on OTEC activities as it is closely interrelated with investments and sustainable energy policy of the nations.

Since OTEC represents a promising frontier in renewable energy, harnessing the vast potential of the ocean's thermal gradients. The intricacies of this technology necessitate specific legislation tailored to its unique challenges. As OTEC involves extracting energy from the ocean, legislation becomes crucial for environmental regulation, ensuring that projects adhere to rigorous standards to safeguard marine ecosystems.

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Moreover, specific laws are needed for resource management, delineating suitable areas for OTEC operations, addressing potential conflicts with other marine activities, and establishing guidelines for responsible resource utilization. Safety standards are paramount, and legislation is essential to set forth guidelines for the secure design, construction, and operation of OTEC facilities, prioritizing the protection of workers, the public, and the marine environment. Permitting and licensing procedures also require a legislative framework to streamline approvals, define criteria, and ensure adherence to legal and regulatory requirements.

Legislation can further encourage technology development by providing support and incentives, fostering international cooperation to ensure consistency in standards and regulations. In essence, specific legislation is the linchpin for responsible and sustainable OTEC development, balancing the pursuit of clean energy with environmental stewardship and safety.

Background

Much are said about the vacuum of laws which caused most economic activities to fail. Even if the activities are properly regulated, they do face the same dilemmas but for them it is a matter of effectiveness rather the disability to regulate conducts. No country in this world can exist without laws. In contrast, by looking at a stateless country like Somalia, it is the failure of the government to provide law and order which would benefit Somalians with what they really need i.e. economic development (Leeson, 2007). A proper and functioning legal framework must exist prior to the effectiveness of such laws from being questioned. There is a need to formulate laws and face the challenges and expectations of any kind for the new development.

Law plays a pivotal role in society, serving as the backbone of order, justice, and fairness. Its importance is multifaceted, encompassing various aspects that contribute to the smooth functioning of communities and nations.

The main issue with OTEC is that until now there is no legal framework existing in the world to be able to cater the spectrum of OTEC activities that might be impacted and cause legal issues (Seeley, 1980). Investments amount are high for OTEC commercial plants to be developed and managed right from the start until the end (Jaafar Bakar, Rani, Shaukat, & Suzana, 2014). The need to review the progress of law in line with the intended commercialisation of OTEC would enable both legal and policy makers to understand, foresee and anticipate issues that could arise, from understanding the legal positions of other countries. These countries can co-operate inter se and learn to develop the best mechanism of regulating this activity (Leary & Esteban, 2009; The OECD Regulatory Policy Committee, 2012). The outcome should shed some lights on the position of OTEC in terms of commercialisation and its full deployment as a mean of sustainable and reliable base load source of energy for the world.

Law is needed to assist the implementation of mega development to monitor, supervise, regulate and decommissioning of activity. This is because the spectrum of activities that would be involve are very much like those of oil, comprises of upstream and downstream activities closely related to the main trust of the activity, producing electricity (energy). Managing ocean renewables requires the implementation of both legal and administrative policies from the beginning of the activities like licencing, permits, environmental regulations adherence with

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Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) requirements (European Commission, 2014). The issue to comprehend is how far from these countries who are pursuing the technology commercially, are prepared in terms of the specific law on such activities.

Methodology

11 countries were selected in the study namely because of their direct involvement with OTEC in various stages of research and development towards its intended implementations within those countries. The method used is by using the legal research method or legal hermeneutics where several nations' legal documents are studied and examined to find out whether they are legally prepared for such activity commercially. The interpretations of legal texts provide descriptive rather than normative insights to the issue of legal readiness of those countries being investigated. The twelve countries chosen are based on their indication of planning, their progress in the research and development of OTEC. Some of the countries had already started to conduct research plants with the view of commercialising it. Though many more countries are identified as able to develop and activate OTEC technology, the chosen nations in this paper are those meeting the categories mentioned.

Findings

The table below is a summary of the nation's implementing OTEC. The result had shown that even though all the countries studied did embark on OTEC research and development, only the United States of America has gone far to the formulation of specific Acts concerning OTEC activities. However, they have yet to come with a comprehensive framework on OTEC itself. This may be because the benefits of utilising OTEC are not conducive enough for the country resulting from location in utilising the technology or other issues. Given the number of years to formulate and promulgate a new law (Carey, 2013) as in the case of the OTEC 1980, it sure has a long way for realization.

Table 1. OTEC Potential Nations And The Law

No	OTEC implementation nations	OTEC R & D Stage	OTEC R & D Plant(s)	OTEC full commercial plant(s)	OTEC policy	Renewable Energy Law (General)	Specific law(s) on OTEC or OTEDD
1	Japan	Yes	Yes	-	-	Yes	-
2	France	Yes	Yes	-	-	Yes	-
3	United States	Yes	Yes	-	Yes	Yes	Yes
4	Korea	Yes	Yes	-	-	Yes	-
5	Taiwan	Yes	-	-	-	Yes	-
6	China	Yes	-	-	-	Yes	-
7	India	Yes	Yes	-	-	Yes	-
8	Philippines	Yes	-	-	-	Yes	-
9	Indonesia	Yes	-	-	-	Yes	-
10	Netherland	Yes	-	-	-	Yes	-
11	Malaysia	Yes	-	-	-	Yes	Yes/No

Source: Created by the authors

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Discussions

The above nations are countries that are directly involved in the research and development stage of OTEC, since there are no commercial plants yet, the discussion of development of OTEC technology and its potential implementation must be in line with the legal preparedness prior to launching a commercial plant(s). They are as follows:

Japan

Ensuing the oil crises in the 1970s, energy diversification concerns in Japan grew. It led to the establishment of a semi-governmental organization; The New Energy and Industrial Technology Development Organization (NEDO) in 1980. The aim was to promote the introduction of new energy technologies. This includes research and development of industrial technology in promoting Okinawa Prefecture Deep Seawater Research Center into building the OTEC demonstration facility plant located at Kumejima Island, Okinawa Prefecture, Japan. Other facilities are located at Nauru and Imari. The facility in Okinawa has proven to increase the average per capita income of the surrounding community significantly (Marziah et al., 2015).

Since there is yet to be a commercialisation of OTEC in Japan, the establishment of an OTEC legal framework is not happening as to date. Japan mainly relies on the Environment Impact Assessment (EIA) 1997 where various types of projects are being subjected to the EIA Law including power plants, a very important measure to prevent environmental degradation and promoting a sustainable society (Environmental Impact Assessment Division, n.d.). OTEC power plant which was realised in 2012 is a vision of the Japan Government policy based on the cabinet decision in March 2008 to promote natural energy exploration within the Japan's marine zones (Kitazawa, 2015). Nevertheless, the need for a comprehensive regulatory measure has yet to be established since there is no commercial plant. Prime Minister Shinzo Abe had conducted Ocean Policy meeting at the Prime Minister's Office forming the Basic Policy concerning Preservation and Management of Remote Islands for Management of the Sea. The vision to be attain was "the establishment of the order of the sea based on laws under international cooperation with related countries is needed" (Headquarters for Ocean Policy, 2013).

France

OTEC is stated in its conception in 1881 by a French engineer and physicist Arsene d'Arsonval. Efforts were made towards the improvement of the cold-water intake pipe design and has gained progress but not significantly able to break through commercially. Nevertheless in 2015, French companies, Akuo Energy and DCNS have constructed an OTEC plant with the capacity of 14-16 MW at Martinique Island making it the biggest OTEC platform ever built (Dessne, Golmen, Banerjee, Duckers, & Blanchard, 2015). Another OTEC project known is at La Reunion in the Indian Ocean.

As far as the law is concern, France too does not have a specific law on OTEC even though they are the closest to building a commercial plant. Since France is a member of European Union, the policies and visions of EU shall play a role in its outlook on OTEC. A policy framework on climate and energy for the period from 2020 to 2030 by the European Commission to the EU parliament includes OTEC and the other ocean renewable as "ocean energy"(European Commission, 2014) where the EU intends to increase the usage of renewable energy and thus reducing greenhouse gas emissions (European Commission, 2014). France as

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one of EU countries which includes ocean energy within their National Renewable Energy Action Plans.

United States

United States and OTEC had gone a long way together as they are among the pioneers of OTEC installations which started due to oil crisis. The test facility for OTEC technology started in 1974 at Kona District, Big Island, Hawaii. It has generated power of 210k while at the same time 4,118.3 cubic feet (4,300 cubic meters) of purified water per day are produced for consumption purposes (Office of Energy Efficiency & Renewable Energy, 2013). The facility has been connected to the United States grid since 2015.

The main legislation is the OTEC Act 1980 which authorises and regulates the construction, location, ownership, and operation of OTEC facilities within the territorial sea of the United States or are connected by pipelines or cables. The other Act enacted is Ocean Thermal Energy Conversion Research, Development, and Demonstration Act (1980) which is to establish an accelerated research and development program within the Department of Energy. It is aimed at fostering the use of ocean thermal energy conversion (OTEC) facilities in meeting the long-term energy needs of the United States.

The US Acts have not been tested due to the non-existence of OTEC developer to develop the technology commercially. However, in years coming ahead with the new enthusiasm for sustainable renewable energy, it might see the involvement of US companies on OTEC commercialisation project both in the US and elsewhere. One thing that is glaring about the United States is their refusal to sign the United Nation Convention of the Laws of the Seas (UNCLOS) perhaps because they know once it is signed, then it is going to be binding on them. They would rather be 'free' in deciding what they can or cannot do.

Korea

The Korea Research Institute of Ships & Ocean Engineering (KRISO) with the association of Korea Institute of Ocean Science and Technology (KIOST) completed the 20kW OTEC pilot plant for public demonstration. Based upon its success in 2013 plans to building and operate a 200kW OTEC plant. The objective is to develop technologies for the design of a 1MW OTEC plant in 2015. OTEC is being promoted based on the technology development projects under the Ministry of Maritime Affairs and Fisheries as "Development of Deep-Seawater Energy Application Technologies" (Ho-Saeng, Young-Kwon, Young-Seok, Seung-Teak, & Hyeon-Ju, 2015).

The strategic plan for the "Mid-Term and Long-Term Clean Ocean Energy Development plan 2015 2025"has been recently established, targeted at national level with long term planning and goals for new and renewable energy development in the period between 2015 and 2025. The strategy plan, which has been jointly developed by the MOF (Ministry of Oceans and Fisheries) and MOTIE (Ministry of Trade, Industry and Energy), was approved by the National Science and Technology Council in 2015. Its objectives are to reinforce the infrastructures and accelerate the commercial development and organise the open sea testing facilities for wave and current devices. Korea is collaborating with South Pacific Islands for the implementation of OTEC. Thus there is no specific policy or laws on OTEC in Korea.

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China

China is seen to embark on the development of OTEC. The plan for 10MW OTEC closed system prototype power plant off the coast of Hainan Island, China. It will be jointly developed by Reignwood Group and Lockheed Martin. The companies sign a memorandum of agreement was for the purpose (Strickland, 2013). First Institute of Oceanography of the National Bureau of Oceanography has developed a 15kW closed-cycle OTEC system with the support of the National High Technology Research and Development Program (Y. Wang & Zhao, 2016; Zhang, Lin, & Liu, 2014).

Since China is yet to conduct OTEC development towards commercialisation thus there has yet to be seen for the need of a specific policy on OTEC and a specific law on OTEC. At present, there is no specific legal basis for the development and utilisation of marine renewable energy, nor legal protection for the developers in China. As a result the Chinese Government is incapable in supporting substantive development of their marine renewable energy and cause in a slow development of China's marine energy industry (Chang & Wang, 2017).

Taiwan

Taiwan has actively been interested in exploiting ocean thermal resources especially towards east coast where the conditions are ripe for such utilisation. For the last 15 years there have been significant efforts in promoting international cooperation, with the assistance of Taiwan's Industrial Technology Research Institute (ITRI) in research concerning deep ocean water applications. In advocating ocean thermal, Taipower in 2009 has completed a feasibility study plus the preliminary design of an OTEC hybrid pilot power plant. Given the result of the feasibility study, Taipower aimed to invest towards the second stage of the Deep Seawater Low Temperature Utilization, Research and Development Project in 2010.

Taiwan also does not have specific laws on OTEC however they are committed in ensuring the activities of power plants comply with the environmental protection laws and regulations concerning environmental aspect. Environmental Impact Assessment would be mandatory prior to approval for any related activities.

India

India has embarked into OTEC development in 2001 by having an OTEC prototype “Sagar-Shakthi” the 1MW Closed Cycle OTEC power plant (barge) as a joint demonstration project between Saga University (Japan) and NIOT of India (Kobayashi, 2001) 35km off Tiruchendur coast, Tamil Nadu, India. DCNS cooperated with India Navy to produce 20MW OTEC plant off Andaman & Nicobar Island in 2015 to power its base in Andaman & Nicobar Islands. It is aimed that the generation of energy or electricity from such plant would be enough to produce 20 MW of power for the use of both the naval and air facilities located on the island. Pre-feasibility studies has been carried out by DCNS to the Indian Navy for that purpose.

The Ministry of New and Renewable Energy of India had identified OTEC under the ocean energy category of new technologies. India, like Malaysia, comprises of Central and states demarcation. However, unlike Malaysia, electricity was a joint ownership as a concurrent subject shared between Central Government and States. The Central Government’s aim for the development of renewable energy is a bit hampered as the constitutional framework prevents the Centre from realising its vision without the support of the states. The Act concerning renewable energy would be the Electricity Act 2003. Sadly, there are no OTEC

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specific policy and law enacted. It is hoped that the new planned renewable energy in 2015 would actively promote renewable energy resources. India, even though they are leading the way with their own OTEC demonstration project, the legislations are regrettably far left behind from its progress.

Philippines

The Philippines are gifted in a way where its position near the equator and depth of the surrounding ocean could easily adopt the use of ocean thermal energy. There is currently a proposal by a UK company, Energy Island Bell Pirie Ltd. to construct a 10-megawatt closed-cycle OTEC facility in Cabangan, Philippines as a pilot project.

The Renewable Energy Act (2008) has identified OTEC as a technology from the ocean under ocean energy sources. This could be used to support and promote the development of OTEC and safeguard the country's security of energy. Ocean Energy Systems in the Act is being referred to as "energy systems which convert ocean or tidal current, ocean thermal gradient or wave energy into electrical or mechanical energy". This act promotes the development, the utilization and commercialization of renewable energy resources. Being a new and quite comprehensive Act on renewable energy it is understood that its lacking ability to set a Feed-In Tariffs for OTEC.

Indonesia

OTEC Research and development activities in Indonesia is conducted through cooperation agreements between companies to develop renewable energy projects in Indonesia such as wind, solar photovoltaic and ocean thermal energy conversion (OTEC). Various sites around the country have been identified for such activities especially on remote islands of Indonesia that is highly dependent on fossil fuel for electricity generation. Morotai Island (Koto & Negara, 2016), Mentawai (Koto, 2016), Sabang, Aceh (Dinas Komunikasi Informatika dan Persandian Aceh, 2017), West Sumatera (Octaviani, Muslim, Buwono, & Faturachman, 2016), Bali Island (Octaviani et al., 2016) are only some of the locations identified. France, through the French Agency for Development, contributed 500 000 EUR grant dedicated to the development of OTEC technology in Indonesia(AFD-Press relations, 2016).

The provinces of Aceh, Jakarta, Yogyakarta, Papua, and West Papua has gained legislative privilege and autonomy as compared to other provinces. With this, the Acehnese government has able to create a self-governing legal system. Aceh however is not yet ready to enact their own policy and law regarding OTEC development. The Energy and Mineral Resources Minister Sudirman Said has stated that Indonesia encourages renewable energy from the sea as part of the Government's Marine Development Policy. However, there are no specific laws on OTEC, only laws concerning renewables form the 2009 Electric Law, 2007 Investment Law, 2009 Environment Law (PwC Indonesia, 2016). Nevertheless, a specific law has been created for geothermal known as 2014 Geothermal Law in regulating activities on geothermal matters. Even though Indonesia could be summarised as having the biggest potential areas to embark on OTEC activities, the legislators could be sceptical for not being convinced to create a specific law on OTEC activities.

Netherland

The Netherlands is also considered as a front runner in OTEC technology. The country is renowned for its maritime industry and has shown a long-term dedication towards ocean energy

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research and development. The Netherland does not have any test plants but since the 1990s, the Ministry of Economic Affairs has initiated a number of grants via generic R&D instruments and on OTEC to BlueRise Company on OTEC research OTEC Pilot Curacao (500 kW)
.
Despite having a central permitting system, the practice of consenting for renewable matters like OTEC require an engagement with wider range of permitting bodies like the Central Government, province, municipality, regional water board and local harbour authorities and Ministry of Defence. However, there is yet no discussion concerning ocean energy which comes into focus for the consideration whether to create or improve current legislations or regulations.

Malaysia

Malaysia has not established its own research plant but are gearing towards the commercialisation of the technology instead. The reason is that the technology is readily available thus there is no time to be wasted in implementing the technology commercially. The Ocean Thermal Energy Centre is currently pursuing the working of a bill for the purpose of preparing OTEC for such purpose. Without a proper legal framework, the ability for investors to secure their investment cannot be guaranteed especially if it is known that banks generally will play a major role in the finance of renewable energy development (European Commission, 2014). This is very crucial as investment of OTEC plants are indeed very high but cheaper in the long run as compared to fossil energy generated plants.

Even though there is no existing law on OTEC, there is the move towards proposing a proper legal provision towards enacting legislation for OTEC development in Malaysia (Abdul Rani et al., 2017). Yet recently on April 25, 2024, the State of Sabah Legislative Assembly passed the Ocean Thermal Energy Conversion (OTEC) Bill 2024, establishing a legal framework for OTEC development for Sabah state (The Star, 2024). This enactment provides legal empowerment capabilities for the Energy Commission of Sabah (ECoS) to starts regulating activities related to the any exploration, construction, and operation of OTEC facilities in the state and its waters. While this legislation applies specifically to Sabah, it marks a significant step toward formalizing OTEC development within Malaysia. However, the actual implementation is yet to take place and the issue whether there would be a conflict in legal jurisdictions between the Federal laws and the state laws is yet to be determined.

It is seen that the Malaysian law on renewable energy is quite progressive and advanced as well as all the countries mentioned above. The Constitution of Malaysia, both the Federal List and State List, is evident over the power to create laws on energy under the jurisdiction of the Federal Government (Government of Malaysia, 1957). Thus, Ocean thermal energy should better fall within the purview of the Malaysian Federal Government to legislate. This would provide a better blanket jurisdiction and uniformity of laws and activities relating to the any development of OTEC in the country. Nevertheless, Sabah move to advance the law on OTEC legal development for Malaysia is highly commendable. This push is needed to advance the preparedness towards adopting OTEC technology here in Malaysia.

The Renewable Energy Act 2011 (Act 725) however, did not clearly state “ocean thermal energy” in its schedule of renewable resource. Instead, the list of renewable resources listed are “biogas”, “biomass”, “small hydropower”, and “solar photovoltaic energy”. Impliedly, it could be seen from “renewable energy installations” definition section, where the word thermal

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was identified. The Minister has the exclusive right to amend the schedule in adding OTEC under section 63 of the Act if the need arises. This has to be amended to incorporate OTEC as a legally recognised source of renewable energy in Malaysia.

It is known that ambiguities and indefinite issues are not helpful in promoting a robust business environment. In contrast, a clear and precise legislation contributes positively to the development of a strong economy. The Petronas Berhad, a corporation created as a result of the Petroleum Development Act 1974 (Act 144) acting as the custodian of petroleum development in Malaysia is a good example of control by the Federal Government. The case of Petronas Berhad creation trough Petronas Act could be taken as an exemplary step into establishing a central body to administer all activities while the regulatory requirements needed to regulate OTEC activities could be given to a supervisory council. Perhaps, by establishing an Ocean Thermal Energy Development Act (OTED Act) and together with it, the establishment of governmental link company (GLC) under the name of OTEC Nasional (OTENAS), it can centralise all administrative matters and tackle issues like royalty, concession, issuance of zone blocks and other related issues. It can also regulate all upstream and downstream activities of OTEC.

Conclusion

Greater emphasis must be made by policymakers for those who support OTEC development in their countries. This would create a better understanding and a good footing in embarking into a new technology as important as this. Since the study was conducted only to those known to have a research and development background of OTEC, the rest of the countries would be able to garner this technology for creating a specific law or even policies on OTEC. The reason why all the other countries are not active towards the formulation of OTEC is perhaps the time taken to have the whole process of creating a policy and followed by a specific law. Nonetheless, with the delay of having a forward looking might be detrimental to the activation of a commercial plant. Not having enough technology is not an excuse because OTEC does not only provide the answer to energy crisis in the world but also its ability to provide source or water. There are so many countries that is deprived of water supply, and they could utilise the OTEC technology to solve issues on water dilemma. Water conflict may well lead to war, thus, steps towards eradicating water shortages should be seriously taken into considerations (Cahan, 2017; R. Y. Wang et al., 2016).

The ability to provide proper regulatory mechanism would iron out the history of ocean renewable power projects. Problems of permits for location and types of technology to be utilised from many agencies should be solved. Variations and inconsistencies of the law would just lead to regulatory uncertainties. This in turn increases cost and the chances of not able to secure project financing. Its ripple effect would be on interested parties to embark on similar projects. Therefore, ensuring a holistic regulatory scheme of proper regimes on laws of renewable energy especially on OTEC technology, would enhance the regulatory framework for the development of renewable energy in the world.

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