Reply to :

Offshore Renewable Energy Future Framework Policy

Iam a seasoned professional with a background in irrigation design, aquaponics, livestock farming and water treatment. I'm skilled in using AutoCAD for designing irrigation systems, and I enjoy creating custom water treatment solutions based on client needs. I've worked on projects like rainwater harvesting systems and figuring out the right sizes for heat and pool pumps. Additionally, I actively contribute to research for better pool heat pump efficiency.

I also help on-site engineers through remote monitoring technology. I've been part of developing handy tools like pump selectors and heat pump selection tools. My main focus is on the European markets, where I provide support for smart irrigation controllers and assist with various water products, including heat pumps, water pumps, swimming pool accessories, and irrigation gear.

Beyond the technical side, I'm into writing too! I've penned blogs, articles, and forum responses on water products and sustainable engineering. I've even conducted technical training for sales teams in different European countries, making sure everyone is up to speed on the latest tech in our field.

I am Currently pursuing a master's in [redacted], my main focus is on [redacted]. I have covered subjects such as [redacted] in my first semester. I am particularly interested in technology that contributes to decarbonizing systems. To delve deeper into this area, I have selected the module [redacted] in my second semester. Now, I am even more excited about the ideology. As a human being, I aspire to contribute to the world through a career in renewable engineering applications.

Kind regards,

[redacted]

[redacted].

[redacted]

[redacted]

I would like to express my opinion that it would be beneficial to plan **offshore aquaculture alongside offshore wind farm energy** for a more comprehensive and sustainable approach.

From the consultation draft, **page no 32(Co - Existance)** will pin point the section aquaculture, but there is no explanation on how it was done, so I would like to give a brief on importance of integrating the aquaculture with wind farm with some case studies.

There is always a doubt in fish farming people aren't we going to need to remove industry from our environment in order to achieve this vision of a healthy ocean?.

I propose considering the integration of offshore aquaculture alongside the development of offshore wind farms. This approach aligns with the concept of the "blue economy," emphasizing the sustainable use of ocean resources to boost livelihoods, foster economic growth, and generate employment while safeguarding the health of our marine ecosystems [1]. Drawing inspiration from successful initiatives like "Rigs to Reefs," which transforms offshore oil and gas platforms into artificial reefs, we can explore similar practices for wind energy platforms. Instead of entirely dismantling these structures, modifying them could provide a unique opportunity to coexist with marine life, similar to the way decommissioned oil platforms foster rich ecosystems [2].

The existing Rigs to Reefs program showcases the benefits of re-purposing offshore platforms to preserve marine biodiversity. These modified structures not only serve as artificial reefs but also offer a sustainable habitat for various species, contributing to a healthier marine environment. The positive outcomes extend beyond ecology, as decommissioning costs are significantly reduced, allowing for a mutually beneficial arrangement where cost savings are shared with state initiatives.

While Ireland may not currently have offshore oil platforms, the imminent development of offshore wind turbines presents a comparable opportunity. As we transition away from traditional fossil fuels, offshore wind has emerged as a rapidly growing sector within the global energy landscape.

Traditionally, wind turbines and oil platforms have been viewed as intrusive elements marring the natural beauty of the horizon. The prospect of a large wind turbine in one's backyard is not a universally appealing vision. However, beneath the surface lies a captivating story of marine ecosystems flourishing around these structures. Allow me to illustrate this phenomenon through a case study in the North Sea, where numerous offshore wind turbines are altering the marine environment in unexpected and beneficial ways, akin to their oil platform counterparts.[3]

These offshore wind turbines are emerging as inadvertent champions of marine biodiversity, functioning as artificial reefs that enhance the complex nature of the marine ecosystem. This transformation holds particular significance in regions grappling with challenges like near-shore erosion, pollution, runoff, and red tides, all of which contribute to the degradation of natural reef environments near the shore. In response to these challenges, marine species are adapting and migrating offshore, seeking refuge around structures such as wind farms and offshore oil platforms. An intriguing revelation is that 20% of the North Sea's blue mussel stocks are now exclusively found thriving on offshore wind turbines, underscoring the positive impact of these structures on marine life.[3]

This paradigm shift challenges the conventional perception of offshore structures and positions wind turbines as dynamic contributors to marine conservation. The unintended consequence of offshore wind turbines evolving into artificial reefs presents an opportunity for a more symbiotic relationship between our energy infrastructure and the natural environment. This transformative process is not merely a compensatory measure for near-shore habitat loss; it holds the promise of actively increasing biodiversity. Drawing inspiration from the ecological benefits observed in offshore oil platforms, we anticipate a similar trajectory for offshore wind turbines. These structures have the potential to evolve into some of the most productive marine green ecosystems on the planet, contributing significantly to the health and diversity of our oceans.

The timing of this potential transformation aligns seamlessly with the growing global demand for seafood, projected to escalate from 100 to 180 million tons by 2030.[4] To address the ensuing 80 million ton deficit sustainably, the role of aquaculture becomes paramount. Aquaculture, essentially farming underwater, presents an innovative solution to relieve pressure on wild fish stocks while meeting the rising demand for seafood. Imagine a future where offshore wind turbines not only fulfill their primary role as energy producers but also serve as catalysts for sustainable living. Particularly in regions like New England, where deeper waters necessitate floating structures, these turbines can be designed to incorporate aquaculture practices. This approach not only provides a renewable source of energy but also offers a sustainable and local supply of food, creating jobs and fostering economic growth in the process.

Instances from around the world, such as the wind turbine-based aquaculture farm in the Netherlands producing seaweed and generating substantial power, exemplify the feasibility and potential of this dual-purpose approach.[5]The relationship between the power consumption of a fish farm and the expected power production from a wind turbine is crucial for assessing the feasibility and efficiency of using wind energy to supply offshore aquaculture facilities. By analyzing the power consumption patterns of the fish farm and estimating the power production potential of the wind turbine based on factors like wind speed and turbine capacity, it aims to determine the balance between energy supply and demand. Discrepancies between power consumption and production highlight the need for additional energy sources or storage solutions to optimize energy balance and ensure a reliable power supply for the fish farm. Challenges such as variations in power production and the importance of energy storage to address fluctuations in supply are identified, emphasizing the significance of aligning power production with consumption requirements for sustainable offshore fish farming operations. I am thrilled to share with you a compelling example of the intersection between renewable energy and aquaculture, currently taking place in the Netherlands. A wind turbine-based aquaculture farm there is not only producing approximately 30,000 pounds of seaweed annually but is also generating a substantial 370 megawatts of power. The dual functionality of this initiative underscores the exciting potential that exists at the nexus of sustainable food production and renewable energy.

The success of similar ventures globally demonstrates the feasibility and practicality of integrating aquaculture with wind energy. The wind turbine-based aquaculture farm in the Netherlands not only contributes to the local food supply chain, providing ingredients for various food products, including milk, yogurt, and ice cream but also makes a substantial impact on electricity generation, powering up to 50,000 homes. While the prospects for offshore wind energy in ireland are promising, it is crucial to acknowledge and address opposition, particularly from the commercial and recreational fishing communities. Historically, fishermen have expressed concerns about the potential negative impacts on their livelihoods stemming from offshore structures. However, a changing perspective is evident as oil platforms are increasingly recognized as fisheries hotspots.

In California, for instance, the adult species of rockfish, a popular recreational catch, are predominantly found exclusively around offshore oil platforms. This shift in perception opens the door to collaborative efforts where both the fishing industry and proponents of renewable energy can find common ground for coexistence.[6]

I wanted to share a noteworthy example from the Gulf of Mexico, where it is widely believed that the red snapper industry thrives due to the presence of oil platforms. In a shift from historical perspectives, fishermen in this region now welcome the development of such structures and express concerns about their removal. This change reflects a growing understanding of the positive role offshore platforms play in supporting marine ecosystems and associated industries.[7]

The reality is that our oceans are a vital resource, and their utilization is inevitable to meet the needs of our expanding populations and the energy demands of modern society. Rather than fostering a divisive "us versus them" mentality between fishermen and wind energy advocates, or environmentalists and oil and gas proponents, there lies an opportunity for collaboration. By embracing a mindset of cooperation, we can move beyond existing conflicts and explore innovative ways to manage our oceans sustainably. It is essential to recognize that these bodies of water are not just spaces for contention but arenas where diverse industries can coexist and thrive. The success observed in regions like the Gulf of Mexico highlights the potential for harmonious collaboration between traditional and emerging ocean-based sectors. As we collectively shape policies and practices for Ireland's offshore energy future, let us actively seek out and create opportunities for creative ocean management. By doing so, we can build both literal and figurative platforms for new industries to responsibly utilize our oceans, fostering a shared commitment to conserving these valuable resources for future generations.

Summary:

The following is the summary of the whole beneficial to plan offshore aquaculture alongside offshore wind farm energy.

Advocating Integration of Offshore Aquaculture and Wind Farm Energy:

- Proposing the integration of offshore aquaculture with wind farm energy for a more comprehensive and sustainable approach.
- Citing the "blue economy" concept, emphasizing sustainable ocean resource use for economic growth while preserving marine health.

Addressing Lack of Information in Draft:

- Highlighting a gap in the consultation draft on the integration of aquaculture, referencing page 32 (Co-Existence).
- Expressing the intent to provide a brief on the importance of this integration, supported by case studies.

Transitioning from Oil Platforms to Wind Turbines:

- Drawing inspiration from successful initiatives like "Rigs to Reefs" in oil platforms, suggesting a similar approach for wind energy platforms.
- Emphasizing the benefits of preserving marine biodiversity and reducing decommissioning costs through platform modification.

Showcasing Positive Impact of Wind Turbines on Marine Biodiversity:

- Citing a case study in the North Sea where offshore wind turbines are fostering marine biodiversity, challenging conventional perceptions.
- Highlighting the potential for wind turbines to evolve into productive marine ecosystems, contributing to global seafood demand.

Dual-Purpose Approach:

- Advocating for a dual-purpose approach with wind turbines supporting aquaculture, citing examples like the Netherlands' wind turbine-based aquaculture farm.

Addressing Opposition and Shifting Perspectives:

- Acknowledging opposition from fishing communities but noting changing perspectives as oil platforms are recognized as fisheries hotspots.
- Sharing examples from California and the Gulf of Mexico where offshore structures are welcomed by fishermen.

Promoting Collaboration for Ocean Management:

- Emphasizing the need to move beyond divisive mentalities and collaborate for sustainable ocean management.
- Encouraging the exploration of innovative ways for diverse industries to coexist and thrive in ocean environments.

I appreciate your consideration of these collaborative perspectives and look forward to the positive impact they may have on shaping Ireland's approach to ocean management.

I would like to add one more suggestion on How do liquefied hydrogen, ammonia, and liquid organic hydrogen carriers (LOHC) compare in terms of cost and efficiency for large-scale transportation?

Liquefied hydrogen, ammonia, and liquid organic hydrogen carriers (LOHC) represent three distinct technologies for the large-scale transportation of hydrogen, each with its unique characteristics in terms of cost and efficiency.

Liquefied Hydrogen:

Cost Considerations: Liquefied hydrogen transportation involves the cryogenic storage of hydrogen at extremely low temperatures, necessitating specialized infrastructure such as cryogenic tanks and vessels. The energy-intensive process of liquefaction adds to the overall cost of transportation, including the energy required for compression, storage, and handling .

Efficiency Factors: Liquefied hydrogen offers a high energy density per unit volume, making it efficient for long-distance transportation where pipelines are not feasible. However, challenges such as boil-off losses during storage and transportation, as well as the significant energy requirements for maintaining low temperatures, can impact the overall efficiency of this technology.

Ammonia:

Cost Considerations: Ammonia is a well-established hydrogen carrier with existing infrastructure for production and transportation. It is considered cost-effective compared to other technologies due to its lower energy requirements for storage and transportation. The reconversion of ammonia back into hydrogen at the point of use can also contribute to cost savings.

Efficiency Factors: While ammonia has a lower volumetric energy density compared to liquefied hydrogen, it is more stable and easier to handle. The ability to convert ammonia back into hydrogen through cracking processes offers flexibility in distribution and utilization, making it an attractive option for certain applications.

Liquid Organic Hydrogen Carriers (LOHC):

Cost Considerations: LOHC technology involves reversible hydrogenation and dehydrogenation processes, which can be capital-intensive. The production and transportation of large volumes of LOHC liquid may add to the initial costs of implementing this technology. However, advancements in process efficiency and scale could potentially reduce these costs over time.

Efficiency Factors: LOHC offers the advantage of storing hydrogen in a liquid form at ambient conditions, eliminating the need for cryogenic storage infrastructure. However, the dehydrogenation process requires high temperatures, which can impact energy costs and overall efficiency. Despite these challenges, ongoing research and development efforts aim to improve the efficiency of LOHC systems.

From the paper Large-scale long-distance land-based hydrogen transportation systems [8] the study compared the unit costs of various hydrogen transportation methods at different distances. Here are the key findings:

- Pure Hydrogen Pipelines and Hythane (blending hydrogen into natural gas pipelines) were identified as the least expensive options for hydrogen transportation at distances of 1000 km and 3000 km.
- Ammonia, Liquid Organic Hydrogen Carrier (LOHC), and Truck Transport scenarios were found to be more than twice as expensive as Pure Hydrogen Pipeline and Hythane at 1000 km. At 3000 km, these scenarios were more than 1.5 times as expensive.
- The cost of Hythane transport significantly increases when hydrogen is recovered at higher pressures (>300 psi), making it the most expensive option.
- The uncertainty in the unit cost of Pure Hydrogen Pipeline transport is notably higher at 3000 km compared to 1000 km.

These findings highlight the cost competitiveness of different hydrogen transportation methods over varying distances, providing valuable insights for decision-makers in the hydrogen sector.

7. Reference

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