

The Fukushima Offshore Wind Turbine Farm from the Perspective of Care Ethics


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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

Following the Fukushima Daiichi Reactor meltdown, the Japanese government invested in the Fukushima Offshore Wind Turbine Farm to produce much-needed electrical power and stand as a “symbol of reconstruction” (Fukushima Bureau, 2021) to the people of Japan. ~~Less~~ Fewer than 10 years later, the offshore turbines are being disassembled and decommissioned. The turbines have been cited as experiments and sources of data for the future development of floating wind turbines as well as ~~an example~~examples to be used to install turbines in the future for the country and the world.

However, not much work has been done to analyze the effect of the turbines on society at their conception, during their lifespan, or after their removal. As a major investment by the Japanese Government, the turbines should have a profound impact on local and national society as well as serve as a model for international applications. By not analyzing how these turbines affected the lives of people in the locality and country, future installation and experiment could be forced down a similar path of not properly supplying needs to all of the people it hopes to support.

I assert that the Fukushima Offshore Wind Turbine Farm was a failure due to its inability to demonstrate care to the people of the locality and nation. Using the lens of Care Ethics within the realm of engineering, I will analyze the lack of attentiveness following a disaster, the responsiveness to the needs of the locality, and the competence of the project considering current needs. This three-pronged approach will demonstrate how the turbine farm was designed to meet the needs to certain groups while notably leaving out others. Various news sources and scholarly articles (and lack thereof) will stand as evidence to support this claim.

Background

After the Tōhoku Earthquake and Fukushima Daiichi Reactor meltdown in 2011, the Japanese government pursued new forms of power generation to provide sustainable power for the country and address safety issues introduced by the Fukushima Daiichi Reactor (Kurtenbach, 2013). One year later in 2013, the Japanese government began funding the Fukushima Offshore Wind Consortium (referred to as “the Consortium”) to develop three floating wind turbine platforms and a substation to produce three different levels of energy (2MW, 5MW, and 7MW). These turbines were created as an experiment to test the feasibility of floating wind energy, collect data, and provide energy for the mainland. In 2018, the Fukushima Shinpu (7MW) turbine began disassembly while the other two turbines followed starting in 2021 (Fukushima Bureau, 2021).

Literature Review

While many scholarly works exist analyzing the impact of wind energy and the Fukushima Offshore Wind Turbine Farm, many of these works focus on the outcomes of the experiment or mathematical modeling/analysis of floating wind turbines to be used for future research or installations. These works do not consider the ethical implications of the Offshore Wind Farm and focus on the data or engineering lessons learned from the project.

In Henderson, Leutz, and Fujii’s work *Potential for Floating Offshore Wind Energy in Japanese Waters*, the authors go into a detailed analysis of other offshore floating turbine experiment or installations, followed by an analysis of various sites in Japan that would suit the needs of the country. The article continues into discussing a specific example where an installation could go and detailed analysis of how floating wind turbines work with potential

design options (Henderson, Leutz, & Fujii, 2002). While this article provides overall insight into the development of a turbine farm, it does not note the societal implications of such designs and the impact the turbines would have on their installed regions, excluding the generation of power.

In Minzuno's work *Overview of wind energy policy and development in Japan*, the author explains the history of wind energy in Japan, including a in depth analysis of policy and need in the country before and after the Tōhoku Earthquake and Fukushima Daiichi Reactor meltdown. The author goes on to explain the details of how one might install a wind turbine farm. Specifically, the author details the policy surrounding such issues, the complications and inefficiencies surrounding the process, and bottlenecks and suggestions for improvement (Mizuno, 2013). The paper provides a detailed explanation on a political and economic level of installing a plant and how to create a successful enterprise; however, the work also fails to successfully consider social and ethical factors that would impact the farm's success.

Other academic works directly reference the designs used in the Fukushima Offshore Floating Wind Farm. These papers notably focus on the design structures used, mathematical modeling behind the structure, and material/joint analysis used to determine the structure's stability (Kikuchi & Ishihara, 2019) (Leimeister, Kolios, & Collu, 2018). These papers are purely technical and lack any acknowledgement of economics, politics, and most notably ethics of these structures in society.

While these analyses provide valuable information about the future of offshore wind energy in Japan, they fail to consider all factors that could result in either a successful or failed wind farm. These articles (notably Minzuno's work) fail to mention the Fukushima Offshore Wind Turbine Farm and any analysis on this plan itself. Articles that do focus on this farm are strictly technical and include no economic, political, or ethical aspects of design. This

shortcoming deserves a deeper exploration and analysis in the realm of ethical implications. The projects should be considered not strictly from a scholarly standpoint but also analyze the effect on citizens surrounding them.

Conceptual Framework

The Fukushima Offshore Wind Turbine Farm's ethical and societal implication can be studied through the use of a care ethics framework. Originally developed by Carol Gilligan and Nel Noddings, care ethics emphasizes the relationships between parties and removes the stress on singular rules or actions defining what it means to be ethical. Care ethics emphasizes the context of the situation and uses analysis from a variety of viewpoints to come to a justified answer. Commonly associated with "putting yourself in one's shoes," care ethics allows for an analysis to take place involving multiple parties and factors in "special relationships," such as family, friends, and other non-impartial parties who may have more care than another in a certain outcome (van de Poel, 2011).

Many engineers base their ethical followings on the National Society of Professional Engineers (NSPE) Code of Ethics for Engineers (National Society of Professional Engineers, 2019). The NSPE creates and maintains these publicly available codes that engineers must follow in order to be deemed ethical. This list includes sections on Rules of Practice and Professional Obligations with subsections outlining the finite details of each. This code summarizes actions engineers should take in professional practice in order to design and implement in the most moral and ethical ways possible.

However, more modern analysis of this ethical guide ~~brings forth~~highlights some shortcomings in the code. Warford points out that the ethics of care are notably left out of this

code of ethics and proposes changes to include the ethics of care into the NSPE Code of Ethics. Specifically, Warford suggests an emphasis on the following five caring virtues: attentiveness, responsiveness, respectfulness, competence, and responsibility (Warford, 2018). Each of these virtues comes with their own explanations and implications to the NSPE Code of Ethics themselves ~~and will be applied in detail to the Fukushima Offshore Wind Turbine Platform.~~ Specifically, I will be analyzing this case using the virtues of attentiveness, responsiveness, and competence to the Fukushima Offshore Wind Turbine Farm.

Analysis

The Fukushima Offshore Wind Turbine Farm was an ethical failure to the people of Fukushima, Japan due to the lack of care for the citizens expressed in the Consortium and Japanese Government's decisions. Specifically, The Consortium and the Japanese government lacked care for their citizens most notably in the fields of attentiveness to citizens following a disaster, responsiveness to their citizens to meet their needs ~~the best~~, and competence in planning for what end result will occur. All three of these principles were violated and thus ~~creates~~ created a negative impact from the Consortium on the community despite the scientific success. A project can only be deemed successful if the project benefits all stakeholders in their own way. While this project did provide results for some groups involved, it created harsh negative consequences for others. Considering the project failed some of the stakeholders ~~in their own ways~~, this project should be classified as a failure. Each of the three cases above will be broken down in detail below, demonstrating how the project has failed a specific stakeholder in a specific way.

Attentiveness

The Japanese government failed to attend to the citizens of Fukushima's needs following a disaster. Attentiveness, as defined by Warford, is the ability to recognize when people are in need and acting appropriately (Warford, 2018). In other words, being attentive involves looking at a situation through the lens of all of the situation's affected parties. This distinction becomes most important after a major event or tragedy in a community. Large events such as natural disasters, losses of life, or other publicly reported-on events generate lots of different opinions, lifestyle changes, and other impacts that can affect not just one community, but the world.

In this case, the Tōhoku Earthquake caused a major reactor meltdown at the Fukushima Daiichi Reactor in Fukushima, Japan. This reactor meltdown ~~caused changes to~~ changed the lives of anyone near the nuclear power plant. Major impacts were made to food production in the area and citizens were exposed to radiation, causing major health problems to citizens down the road. (World Health Organization, 2016). This also created a major power shortage in Japan. One of Japan's primary responses to this power shortage was the development of the Fukushima Offshore Wind Turbine Farm as not only a source of power but a symbol of rebuilding the city of Fukushima.

While building the Wind Farm did fill a societal need of providing electricity to Fukushima and nearby cities, it was not the response the people of Fukushima needed in the moment responding to a disaster. The last thing the citizens of Japan wanted to think about was a new way to generate more power and how that could harm their lives. Japan did have the immediate response of evacuating the area to protect citizens from radiation, but people still constantly worry about the safety of eating food or drinking water from the region (Castañon,

n.d.). ~~It is safe to say~~ The primary source of fear and distain of the people in Fukushima and surrounding regions is not around their next power plant, rather if they can eat and drink their locally sourced food and other health and safety reasons. It is more important for the Japanese Government to focus on these issues than dive into another experimental power project.

Another important note is the view of Fukushima at a national and international scale. As the city is now known for its nuclear disaster, it is important to recognize the stigma around the city. Attentiveness to this factor is essential as many businesses and citizens rely on tourism as a source of income. The country marketed supporting the Offshore Wind Farm as a source of tourism and a symbol of rebuilding to the city (Fukushima Bureau, 2021), only to remove the turbines years later. Even years after a disaster, removing the items cited as “beacons of hope” for the city is a major loss to citizens of the city and the city’s perception as a whole. It provided a short term and convenient justification for the turbines while failing to fully address the needs of the city.

This lack of attentiveness to their citizen’s needs shows a shortcoming in the initial development and decision to close the Fukushima Offshore Wind Turbine Farm. To a city reeling from a natural disaster, the country put an emphasis on supplying power through an experiment off the coast of the city instead of directly to the incident at hand.

Responsiveness

The Consortium and Japanese Government failed to show responsiveness to citizens needs by making it harder for citizens to earn a stable living while developing, maintaining, and eventually removing the Fukushima Offshore Floating Wind Turbine Farm. As defined by Warford, responsiveness emphasizes monitoring the outcomes of a solution as well as the

responses to that outcome and adjusting accordingly (Warford, 2018). In other words, responsiveness goes beyond an official press release or start of a project. Being responsive is important though the life cycle of a project and involves constantly changing to best suit the needs of all constituents. As a project develops, it produces expected and unexpected results, and it is the responsibility of the project's owner to respond to these results.

In the case of the Fukushima Offshore Wind Turbine Farm, there was a distinct lack of attentiveness on part of the Consortium towards the people of Fukushima and surrounding areas. One of Fukushima's main industries centers around the seafood and fishing in the city and surrounding areas. After the Fukushima Nuclear Incident, fishing became a major problem in the region due to radiation and radioactive material found in fish. This ~~already~~ reduced the pool of seafood available to the fishermen and decreased their sales by almost an order of magnitude for the years following the incident (Nippon, 2020).

The Fukushima Offshore Wind Turbine platform also involved adding many obstacles to ~~fishing out in the ocean and running back to the shore~~. There may have only been four structures created, but many undersea cables ran between the turbines as well as back to the mainland. This created many areas of hazard for fishermen as they sought to navigate already treacherous terrain. The result is fishermen who were strongly opposed to the installation of these wind turbines (Fukushima Bureau, 2021). While they did eventually agree to the installation, this did not account for the years of maintenance performed and monitoring tasks performed regularly on the turbines. Installing, maintaining, and removing the turbines caused years of disturbances throughout this area of the ocean commonly accessed by fishermen in the region.

The analysis of the responsiveness continues into the symbolism of the turbines as hope for the city and country. The Japanese Government and Consortium helped convince these

fishermen to approve of the turbines by calling them symbols of hope (Fukushima Bureau, 2021). This objective is beneficial to the citizens and shows care expressed by the government and Consortium. However, to go back on their statement and remove funding for the turbines reveals a lack of consistent care when responding to the citizen's needs. Since the government marketed the turbines to citizens as a place to show off and tourism site, people will base their lives around that market. Creating and promoting the market only to remove it years later hurts the people who were newly relying on that market. This shows a lack of responsiveness by the government and Consortium by creating a new market to inspire citizens just to remove it years later.

The Consortium failed to express responsiveness to their people in the development and installation of the Offshore Wind Turbine Farm, specifically in the realm of fishing and tourism. The installation of this farm showed a lack of care towards the fishermen of the region and made their already impacted lives harder to navigate. The removal of the installation also removed a newly created market used by the citizens of Fukushima. These together show a lack of care over time expressed by the government and Consortium.

Competence

The Japanese Government focused their investments on research instead of using the same wealth to take care of its citizens in times of need, showing a lack of competence. Competence is a trait commonly found in existing codes of ethics, but Warford goes a step further in its meaning. Competence is defined as taking care and responsibility for a problem and not passing off such problem with no concern for the outcome (Warford, 2018). In other words, competence deals with taking care of the problem in front of you and assuming

responsibility for that problem. Whatever result comes from a certain problem is the responsibility of the project owner, and, if delegated, the project owner still remains partially responsible.

The Japanese government spent 60 billion yen (or \$560 million US) supporting the Wind Farm (Fukushima Bureau, 2021). This money created 3 turbines that lasted under 10 years in service. Meanwhile, in the same city, people struggled with their day to day lives including health problems, ~~un~~contaminated food and water, and displacement from their homes with effects going on 11+ years. The Japanese government spent excess amounts of money funding the research platform of the Wind Farm and not properly supporting its people in need. That money could have gone to more advanced nuclear cleanup, supporting its citizens, or developing lasting solutions to ongoing issues the country faces today based on the nuclear disaster meltdown. Furthermore, the money spend on the Wind Farm is no longer producing any positive result, including the “symbol of hope” for the city that was promised it to be. The people of Fukushima and surrounding areas are currently getting nothing out of the money spend on these turbines which displays a lack of competence by the Japanese Government.

A counter argument to this claim comes in the inspiration behind why the Wind Farm was created in the first place: as an experiment. As expressed above the Consortium collected lots of valuable data from the farm and developed models that are being used to design floating wind turbines around the world. This is an ultimately good result of these turbines; however, just because these turbines met one need of society doesn't make them fundamentally good. As of today, there is no payoff for the people of Fukushima based on this research. The Japanese Government has a responsibility to provide for its citizens in the short term, not just the long term. The Japanese Government even decided to invest further into coal, a non-renewable

energy source, to produce missing power the country needs (Homewood, 2021). These plants have no base in wind energy or any of the research done by the Consortium. It displays a lack of competence when the Japanese Government chose to invest in these turbines for potential future scientific use while their people struggle in the present.

The Japanese government failed the people of Japan by putting mass funding into the Fukushima Offshore Wind Turbine Farm by wasting precious money on scientific gain instead of meeting its people's needs. The government focused on projects that could yield results for specific parties in the future and did not focus on its people in the present, showing a lack of care for its citizens in distress.

Conclusion

After ~~their-its~~ short lifespan, the Fukushima Offshore Wind Turbine Farm is in the process of being dismantled. The Japanese government and the Consortium failed people throughout the whole lifecycle of this Wind Farm. I assert that they failed to meet the ethical goals of attentiveness, responsiveness, and competence associated with care for the people of Fukushima. Their actions reflect those of engineers designing to learn for scientific purposes without consideration for those they are designing the structure for in the long term. The people of Fukushima needed help, and the Japanese Government and Consortium focused on research for the future instead of taking care of people in the present.

The lessons learned from this example are expandable to many experiments and developments in the field. It is important for engineers to not just consider the design's ideal benefits for a group once complete but also the implications for groups in the moment. There is often a time and place for such experiments; however, it is important to consider the

relationships with the people affected by such experiments. Engineers must accept responsibility for planning and designing around such restrictions and keep the ultimate goal of helping people at all times in mind.

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