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Comments on RFI Deep-Water HVDC Substations for Offshore Wind-eNGO groups

Additional submitted attachment is included below.

Submitted via email and CEC portal to Docket #23-ERDD-01

August 15, 2024

California Energy Commission
Docket Unit, MS-4
Re: Docket No. 23-ERDD-01
715 P Street
Sacramento, CA 95814-5512
docket@energy.ca.gov

Re: Request for Information Deep-Water High-Voltage Direct Current (HVDC) Substations for Offshore Wind, Docket # 23-ERDD-01

On behalf of the Center for Biological Diversity, Ocean Conservation Research, California Coastal Protection Network, and Environmental Defense Center, and our members and supporters, we submit these comments on the Request for Information (RFI) issued by the California Energy Commission Request for Information Deep-Water High-Voltage Direct Current (HVDC) Substations for Offshore Wind, Docket # 23-ERDD-01.

Our comments focus primarily on our concerns related to the impacts of cooling systems for deep water substations for offshore wind on marine resources including heat, noise, entrainment, and impingement.

Our organizations support the development of offshore wind energy to help decarbonize the electric grid and help stem the impacts of climate change and to help California meet the goals set in SB 100 and AB 525. We recognize that substations are a necessary component of development of offshore wind in California. Nevertheless, we are concerned about potential impacts the substations may have on wildlife, water quality, and other ocean resources.

We advocate for policies and actions that ensure renewable energy develops and scales in an environmentally protective manner. But like any industry, offshore wind development will have impacts on the environment. With this in mind, offshore wind projects, including the needed substations, must be developed in a responsible manner while minimizing environmental impacts, protecting biodiversity, cultural resources, public health, and avoiding compromising other ocean uses. Specifically, *responsible* development of offshore wind: (i) avoids, minimizes, mitigates, and monitors adverse impacts on wildlife and habitats, (ii) minimizes negative impacts on other ocean uses, (iii) includes robust consultation with Native American Tribes and communities, (iv) meaningfully engages state and local governments and other interested and affected parties from the outset, (v) includes comprehensive efforts to avoid impacts to underserved communities, and (vi) uses the best available scientific and technological data to ensure science-based community-informed decision making. When developed as described, offshore wind can provide an important opportunity to increase access to renewable energy, reduce carbon emissions and air pollution, and improve grid reliability.

The ocean is experiencing a biodiversity crisis caused by warming water temperatures, ocean acidification, shifts in key oceanographic features and habitat availability, and other harmful changes due to fossil fuel-driven climate change.[1] We must take stronger measures to protect and restore marine life and the habitats they depend on, which are integral to the healthy ocean ecosystems that support California residents and communities. Protecting biodiversity and rapidly transitioning to clean energy need not be in conflict; we can and need to accomplish both goals.

Offshore wind, particularly floating offshore wind that is proposed in the ocean off of California's shoreline, is a new industry. Regarding substations and particularly cooling systems, there appears to be insufficient research into alternative technologies and cost-effective solutions that would avoid, minimize, and mitigate impacts to wildlife, habitats, or other marine resources. Instead, the lack of research into alternative technologies and on potential impacts has lead permitting agencies to approve the use of open-loop or once-through-cooling in several instances based on various grounds.[2] We applaud the CEC for acting proactively to assess the needs for additional information and study in the RFI.

We appreciate the opportunity to address these important issues The following comments are in response to several of the questions posed in the RFI, specifically questions 1, 2, 4, 10, 11:

Question 1. What information or analysis is needed to inform timely and cost-effective development and deployment of deep-water substations and associated offshore electrical infrastructure in existing and future California WEAs? How can publicly funded research and development (R&D) address technological, economic, and environmental uncertainties and better inform strategic technology advancement, feasibility, standards development, and component selection and procurement?

The RFI does not mention cooling systems needed for substations. Additional information and analysis are needed to understand the impacts and costs of deploying substation cooling technologies for proposed substations for floating offshore wind projects. There are multiple

[1] *See, e.g.,* https://opc.ca.gov/climate-change
[2] See, e.g., Sunrise Wind ROD and FEIS available at https://www.boem.gov/renewable-energy/state-activities/sunrise-wind

existing technologies used in on-shore substations and other industrial uses that should be considered, and research is needed into technological improvements that can reduce the need for cooling, reduce impacts of various cooling technologies, and/or reduce costs.
We are particularly concerned that BOEM has permitted the use of open loop cooling for offshore substations and rejected other alternatives based primarily on cost and has not required sufficient information regarding potentially significant impacts during the environmental review stage. Moreover, although BOEM did provide for some monitoring measures in its recent approval of open loop cooling for an offshore substation,[3] it did not establish clear triggers for adaptive management in response to the monitoring. Similarly, although BOEM recognized that closed loop cooling would be more protective, BOEM only noted that the substation "should be retrofitted with a closed-cycle cooling system when the technology is made commercially viable"[4] but did not require retrofitting or definitions that would trigger this requirement.

Publicly funded research on existing alternatives to open loop cooling, including closed loop cooling and air cooling, and other potential new technologies, along with support for development and testing could help better inform the agencies during the environmental review process and provide needed alternatives to ensure that impacts to resources are avoided, minimized and mitigated. Moving forward with that R&D now, before site specific environmental review is undertaken and while the BOEM PEIS is in progress, is critical.

Open loop or once through cooling should not be the default for these new substations. As the CEC is well aware, it has taken decades for the State to reduce and (hopefully soon) eliminate the use of ocean water for once through cooling (or open loop cooling) at power plants along the California coast. If the deep-water substations use a similar open loop ocean water cooling system as those coastal projects, they will have many of the same problems and impacts. Therefore, it is critical to research alternatives that can avoid and minimize those impacts because in many cases there will be no effective mitigation measures available for these impacts.

Question 2: What key metrics or factors are required to inform systems integration of offshore wind components, deep-water substations, associated electrical infrastructure, communication networks, data collection, environmental monitoring, and ancillary services such as secondary generation, hydrogen production, and storage?

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[3] *See, e.g.,* Sunrise Wind FEIS, Appendix H, Mitigation and Monitoring (Errata version), H-223-224 (Cooling Water Intake Structure (CWIS) Requirements and monitoring requirements); H-215-216 (mitigation measures 10, 11, 12 regarding Impingement mortality and entrainment); H-109-110 (measures regarding monitoring of impacts). Available at https://www.boem.gov/renewable-energy/state-activities/appendix-hmitigation-and-monitoring-0
[4] *Id.* at 109.

In order to better address these questions, the public needs more information about the technological systems and requirements that developers are considering. For example:

- What are the typical voltages generated by the turbines?
- Assuming that these voltages are Alternating Current, are they frequency-synchronized and regulated to other turbines feeding the DC Substation, or does each turbine independently feed the DC Substation?
- Are the incoming voltages rectified through switch-mode architectures? If so, what are the typical switching frequencies employed?
- What are the possible technologies used to cool this conversion process, and the respective thermal gain of each proposed technology to the surrounding habitat?
- What is the output voltage of the DC Substation?
- In reconverting the DC to 60Hz after landing the power cables, what are the proposed cooling technologies used at this stage?

After developers provide more information, the CEC should provide another opportunity to comment and provide additional information regarding these technological questions.
Question 2 also asks about hydrogen production and storage. Hydrogen production could require large amounts of water and require desalination. This process including brine discharge would also impact ocean waters and biological resources. Additionally, floating storage systems may have other technological challenges that need to be addressed. Regarding these questions as well, more information is needed to give the public a meaningful context for responding to the CEC's inquiry.

Question 4. What environmental, ecosystem, health, and social impacts, including, both direct and indirect impacts, should be evaluated in deep-water substation and offshore electrical component design, procurement, and deployment for California's existing and future WEAs? How should knowledge about these impacts be used to better inform more sound design, procurement, and deployment of deep-water substation and offshore electrical components?

Environmental impacts from deep-water HVDC substations, or any other kind of substation that may be proposed for the OSW projects, must be fully assessed. Some of these impacts regarding anchoring systems and secondary entanglement may be the same or similar to the impacts of the OSW turbine arrays, but others are different. Needed cooling systems for substations, with the attendant entrainment and impingement risks, heat and noise impacts are substantially different and will have potentially significant impacts that must be considered. In addition, a comprehensive review of alternative cooling systems is required looking at existing technologies utilized in substations and other industrial projects as well as a review of new technologies that could potentially avoid or minimize impacts to ocean resources from substations.

Open Loop Cooling Risks:
<u>Entrapment, Entrainment and Impingement</u>: Open loop cooling systems in the ocean environment have long been shown to have negative impacts from entrainment and impingement of marine life, particularly eggs, larvae (ichthyoplankton), young juvenile fish, and invertebrates with planktonic life stages. Moreover, the discharge of warmer water into the ocean can negatively impact microorganisms and finfish, as well as species higher up in the food chain.

As the CEC publication "Issues and Environmental Impacts Associated with Once-Through Cooling at California's Coastal Power Plants" (June 2005, CEC-700-2005-013) summarized:

> Recent studies required by the California Energy Commission and other State agencies have shown that coastal power plants that use seawater for once-through cooling are contributing to declining fisheries and the degradation of estuaries, bay and coastal waters. These power plants indiscriminately 'fish' the water in these habitats by killing the eggs, larvae, and adults when water drawn from the natural environment flows through the plant (entrainment impacts) and by killing large adult fish and invertebrates that are trapped on intake screens (impingement impacts). These facilities also affect the coastal environment by discharging heated water back into natural environments. Most impacts are to early life stages of fish and shellfish. It is difficult to understand the magnitude of the impact of once-through cooling systems because of a lack of adequate and standardized studies of entrainment. It also is difficult to put an economic value on these ecological losses.

Id. at 1-2.[5] Impacts of once through cooling systems at substations offshore in the wind lease areas may be somewhat different and will likely be greater for marine mammals and turtles. All of these potentially significant impacts of once through cooling systems, and other cooling systems, used for offshore substations must be thoroughly researched along with alternative technologies that can avoid and minimize such impacts.

BOEM has previously identified that marine mammals, sea turtles, and juvenile and adult fish, are all at risk from entrapment from open loop cooling intakes.[6] Zooplankton (which provide

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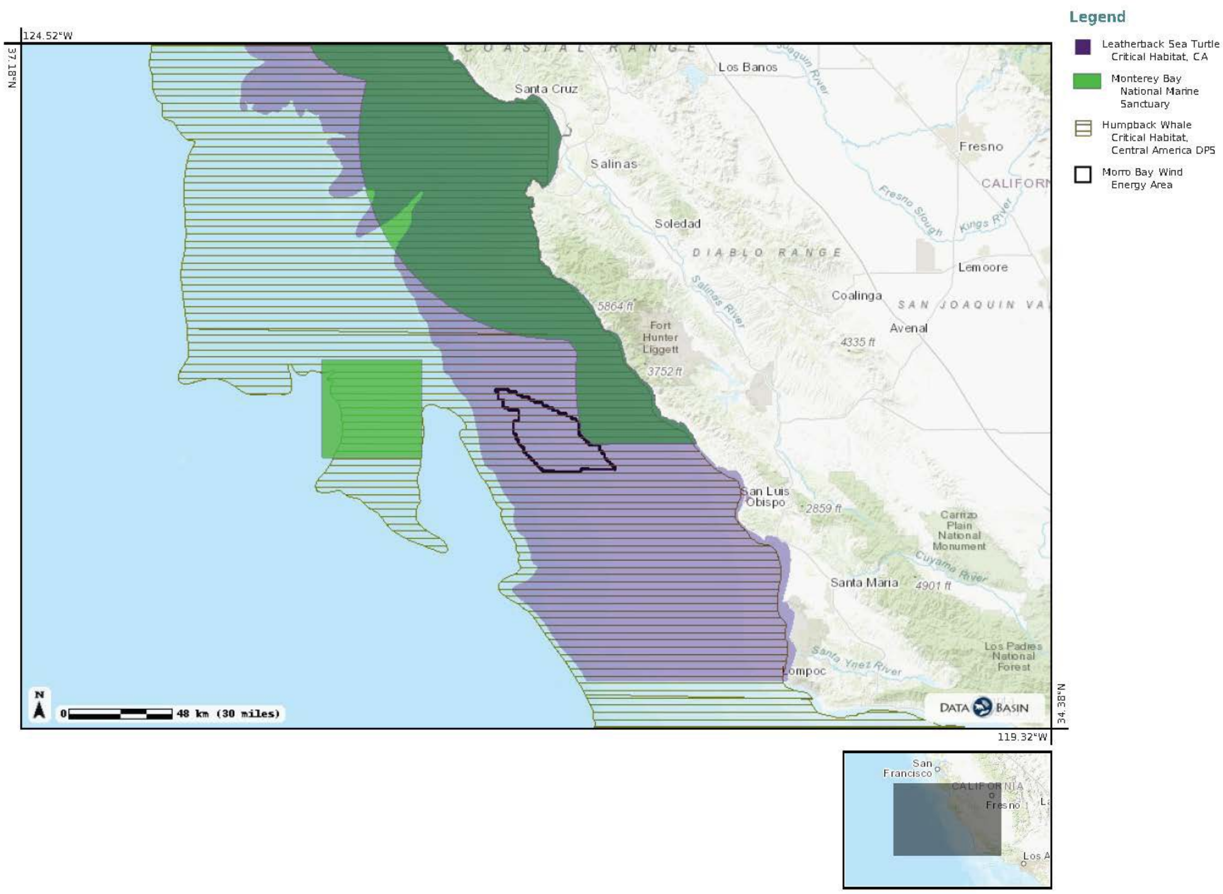
[5] Available at https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=17ad4be1a3e6bd7b9e3c08e9634ca7bf25400619

[6] *See, e.g.,* SouthCoast Wind SCW COP, Volume II at 6-257-258. https://www.boem.gov/renewable-energy/state-activities/mayflower-cop-volume-ii SouthCoast Wind DEIS, Vol. I, at 3.5.5-40 to 41 available at https://www.boem.gov/renewable-energy/state-activities/mayflower-deis-vol-i

prey for marine mammal species), larvae and microorganisms are at risk from entrainment and impingement as well.[7]

Due to the location of the WEAs, utilizing mitigation measures such as siting only where there are significant buffers from sensitive marine resource areas to reduce impacts from cooling systems may not be possible. For example, the Morro Bay WEA is directly adjacent to the Monterey Bay National Marine Sanctuary and proposed Chumash Heritage National Marine Sanctuary, Leatherback sea turtle critical habitat, and Humpback Whale Critical habitat.[8]



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[7] *See, e.g., Id.* (SouthCoast Wind DEIS, Vol. I) at 3.5.2-19 to 20.

[8] There are also additional protections in place in the nearer shore waters Black Abalone Critical Habitat, South Central California steelhead Critical Habitat, the Loggerhead sea turtle conservation area and the Leatherback sea turtle conservation area. 50 CFR § 660.713. (*See also* https://coastwatch.pfeg.noaa.gov/loggerheads/loggerhead_closure.html). California protections in this area include Marine Protected Areas for the Piedras Blancas State Marine Reserve/State Marine Conservation Area and Cambria State Marine Conservation Area.

Heat: Heated water from open loop cooling would be discharged into the ocean creating a warmer zone around the substation—research is needed to assess the amount and scale of this heating which would be a nearly continuous impact to surrounding waters, species and other ocean resources. The rise in ocean water temperatures can have detrimental effects on marine life and shift which species are found in an area. Higher temperatures can lead to increased mortality rates, altered growth and development, and changes in behavior and distribution of species within the ocean environment.

Closed loop cooling systems would not have the same scale of discharges but would also discharge significant amounts of heat to the ocean and air cooling would discharge heat to the air. More research is needed on the scale of heat that would be discharged at these substations and the potential impacts of these temperature changes must be identified and assessed.

Noise: Research is needed to assess the risk from prolonged and consistent exposure to substation noise to species.

Light: Lighting on a large substation at night will have greater impacts than lighting contemplated on the turbines. This must be addressed.

Question 10. What technologies or processes can monitor the condition and performance of deep-water HVDC substations and offshore electrical infrastructure? What are the current resolution capabilities of these technologies? Are these technologies or processes adequate for application in existing or future California WEAs? What are additional operations and maintenance needs for deep-water HVDC substations?

Monitoring all aspects of OSW projects is essential to understand the impacts of this new industry as it begins to be built out. Whichever substation design and cooling systems are ultimately used in the existing WEA areas, the monitoring plan must evaluate the impacts from entrainment and impingement of marine organisms, entrapment of marine mammals, turtles and fish, the impact of heat discharged into to the ecosystem, and noise from substations.

Question 11. Are there any other questions or information the CEC should consider for research on deep-water HVDC substations for offshore wind that is not otherwise covered by the questions above?

As noted above, the questions in the RFI did not mention cooling systems or heat as a critical issue related to substations. We urge the CEC to ensure that the impacts related to these fundamental aspects of the substation design be prioritized in any funding or other R&D support activities by the CEC.

We appreciate the opportunity to provide a response to the RFI and hope and expect that the CEC will provide additional information on many of these questions along with other opportunities to weigh in on both the technological and environmental issues related to substations for offshore wind facilities off of California.

Sincerely,

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