COOLING STATIONS

"HVDC systems operate by converting the alternating current (AC) high voltage electricity produced by the WTGs to direct current (DC) for transport to shore, and then once onshore convert the electricity back to AC for distribution to the grid. HVDC systems do not experience the same losses in power experienced on AC transmission lines at long distances and do not require booster stations along the export cable route. Because of the large amount of heat generated during the conversion of AC to DC at the HVDC converter OSS located in the wind farm, these systems must be cooled when operating.
The most common type of cooling system is an open loop system that intakes cool, filtered sea water and discharges warmer water back into the ocean. Chemicals such as bleach (sodium hypochlorite) may be used in order to prevent growth in the system and keep pipes clean (Middleton and Barnhart 2022).
Page 59 , Volume 1 Draft PEIS Ny Bight
regarding cooling systems.

https://www.boem.gov/sites/default/files/documents/renewable-energy/_NY%20Bight_DraftPEIS_Vol1_Chapters1-4_January2024_508.pdf

https://www.boem.gov/sites/default/files/documents/renewable-energy/_NY%20Bight_DraftPEIS_Vol1_Chapters1-4_January2024_508.pdf

BOEM link regarding sites more than 30 nautical miles.

https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/HVDC%20Cooling%20Systems%20White%20Paper.pdf

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What happens to all the fish larvae, phytoplankton, zooplankton that get caught in that chlorinated wash cycle?

Sunrise Wind mention of cooling system :

https://www.federalregister.gov/documents/2023/02/10/2023-02497/takes-of-marine-mammals-incidental-to-specified-activities-taking-marine-mammals-incidental-to-the

“The OCS-DC requires the withdrawal of raw seawater through a cooling water intake structure (CWIS) to dissipate heat produced through the AC to DC conversion and then discharge this water as thermal effluent to the marine receiving waters. It includes intake pipes and sweater lift pumps (SWLP), course filters, electrochlorination system, heat exchange system, and a dump caisson.

The OCS-DC would discharge non-contact cooling water (NCCW) and non-contact stormwater to the marine receiving waters. The design intake flow (DIF) for the OCS-DC is 8.1 million gallons per day (MGD); however, the Average Flow Intake (AFI) will generally range from 4.0 MGD to 5.3 MGD. The rate at which seawater would be taken (e.g. maximum through-screen velocity [TSV]) is 0.1525 m/s [0.5 ft/s]).

The dump caisson consists of a single outlet vertical pipe oriented downward in the water column. The dump caisson is the primary discharge point for the OCS-DC. Pollutants discharged at the dump caisson will include NCCW and residual chlorine. The temperature of the water exiting the heat exchange system will depend on the ambient air temperature, ambient water temperature, power output, and other factors.

Sunrise Wind indicated the maximum temperature under all operating scenarios and conditions will not exceed 32 °C (90 °F) and the thermal plume is not expected to extend beyond 30 m of the dump caisson.”

Open loop cooling systems can have several negative impacts on the marine environment.

1. Water Intake and Organism Impingement: Open loop cooling systems typically draw large volumes of seawater for cooling purposes. As water is withdrawn from the ocean, marine organisms such as fish, plankton, and larvae can be drawn into the system, leading to impingement and mortality. This can disrupt local ecosystems and harm populations of vulnerable species.

2. Thermal Pollution: Open loop cooling systems release heated water (86-90F) back into the ocean after it has been used to dissipate heat from the conversion of AC to DC electricity. This can result in localized thermal pollution, where the discharged water is warmer than the surrounding environment. Elevated water temperatures can stress marine organisms, disrupt habitat suitability, and alter ecological processes.

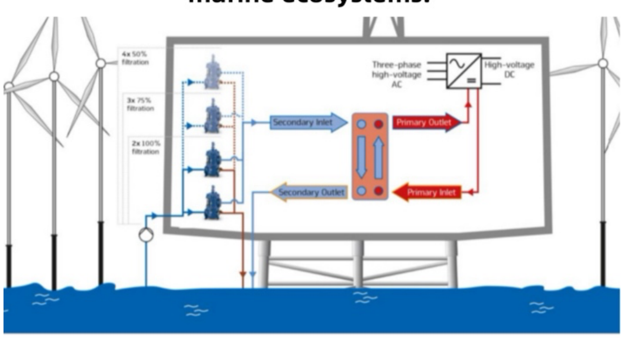
3. Introduction of Non-Native Species: Open loop cooling systems can inadvertently introduce non-native species into marine environments. Organisms that are drawn into the cooling system may be transported across long distances and released into new habitats, where they can outcompete native species, disrupt food webs, and cause ecological imbalances.

4. Chemical Pollution: The operation of open loop cooling systems involve the use of chemicals such as biocides (chlorine) and anti-corrosion agents to prevent fouling and corrosion within the system. Discharge of these chemicals into the marine environment can have toxic effects on marine organisms and contribute to water pollution.

5. Cumulative Impacts: Each cooling system takes in 8,100,000 daily. The cumulative effects of multiple open loop cooling systems operating within a region can exacerbate the negative impacts on marine ecosystems. Concentrated water intake and discharge activities can disrupt local hydrodynamics, alter water quality parameters, and pose significant challenges for ecosystem health and resilience.

In summary, while open loop cooling systems play a crucial role in cooling offshore wind turbines and other industrial processes, their operation can pose significant risks to marine ecosystems.

Open Loop Cooling Systems take in cool ocean water to dissipate heat produced through the AC to DC conversion of electricity. Each offshore cooling systems will discharge up to 8,100,000 gallons of seawater daily , between 86-90 F Chemicals such as chlorine/ bleach (sodium hypochlorite) are used in order to prevent growth in the system and keep pipes clean The cumulative effects of multiple open loop cooling systems operating within a region can exacerbate the negative impacts on marine ecosystems.



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