A U.S. and global perspective on piling noise abatement for marine mammals and learning lessons from permitting and construction of offshore wind projects

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The U.S. Government has made commitments to limit the impacts of underwater sound through federal agencies including the Bureau of Ocean Energy Management (BOEM) and National Marine Fisheries Service (NMFS or NOAA Fisheries) and the implementation of their policies and guidelines. In August 2023 BOEM published "*Nationwide Recommendations for Impact Pile Driving Sound Exposure Modelling and Sound Field Measurement for Offshore Wind Construction and Operations Plans*", which provides direction on how to model and measure noise associated with impact piling during offshore wind project foundation installation. Furthermore, in 2024 NOAA Fisheries issued updated "*Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing*", which provides refined criteria for the evaluation of onset of auditory injury and temporary threshold shifts. Implementation of noise abatement measures is also viewed as an essential component during pile driving activities to minimize impacts to marine mammals.

Based on experience in the field during offshore wind project construction activities it is apparent how critical noise abatement measures are to meeting the guidance and criteria given by BOEM and NOAA Fisheries. Noise abatement measures often include in-situ visual monitoring of clearance and shutdown zones by Protected Species Observers, use of a double bubble curtain, and real-time passive acoustic monitoring program as part of pile driving sound field verification. During construction activities additional lessons learned continue to improve how projects are supported.

The regulatory framework and our experience on offshore wind projects in the U.S. has been found to be applicable in other parts of the world including Canada, the U.K. and Australia. Conversely, it is only logical that lessons learned from countries undergoing offshore development in varying environmental conditions, using different technology, and/or considering sensitive marine species not typically present off the coast of the U.S. will be of value to our future work.