NEPII_01
離岸風機打樁噪音量測及實海域氣球幕減噪測試
The Measure of the Noises Produced by Pile Driving and the Test of Balloon Arrays in Oceanic Construction Projects

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摘要

近年台灣亟欲發展綠色能源，而風力發電技術較為純熟，因此成為重點發展項目。但台灣地狹人稠，陸地使用面積較多限制，因而考慮發展離岸風力發電。而目前所規劃之離岸風力發電潛力場址和中華白海豚重要棲息地鄰近。因此為避免施工噪音影響海洋哺乳類的生態，需進行離岸風機打樁所造成的低頻噪音量測和降噪研究。105 年 9 月初，上緯新能源股份有限公司於西海岸打造兩支離岸風場之示範風機，本團隊於打樁時期利用水下錄音器做噪音監測並做資料分析。另外為降低風機打樁時造成的高強度之低頻噪音，發展了氣球幕減噪工法可縮小影響範圍，減少施工成本亦可達成環境保育的目的。此減噪工法在台灣尚未應用於實海域測試，因此藉由此次合作計畫，並參考了國內外研究成果，於距打樁處 230 米放置了 2 組水下錄音器，其中一組於水下錄音器架設氣球幕，測試其減噪效果。資料分析結果顯示氣球幕減噪效果於頻段 100 至 800 Hz 達到 10 dB 左右的效果。

關鍵詞：氣球幕、低頻打樁噪音。

Abstract

Due to the green power policy in Taiwan, wind power becomes one of the primary focuses because it is refined, renewable, and well established. Because of limited land availability and dense population, the government is taking Offshore Wind Farm (OWF) into consideration. However, the planned location for potential OWF is close to the habitat of the Sousa chinensis (also called Indo-Pacific humpback dolphin or Chinese White Dolphin). In order to protect the marine mammals from the noise produced from the construction and operation of OWF, monitoring and mitigation measures of the pile driving noise during the construction period of the Offshore Wind Turbines are necessary tasks.

This paper reports the mitigation measure of balloon arrays in reducing low frequency noises produced by pile driving at the lowest possible cost, which also protecting the environment by minimize the noise impact zone. In early September 2016, Swancor Renewable Energy Co., Ltd constructed two models of the Offshore Wind Turbines off the western coast of Miaoli, northern Taiwan, which allowed us to use a series of underwater microphones to record and analyze the noise created during the piling. The mitigation effect of the balloon arrays was tested by setting up two moored hydrophones (with recording systems) 230 meters away from the piling location; and one set was covered with balloon arrays and the other without. The data analysis results show that the balloon arrays are effective means to reduce underwater noise. There has 10 dB noise reduction at the 100~800 Hz frequency range.

Keywords: balloon arrays, low-frequency pile driving noise.