

## Technical and Economic Evaluation of Harmonic Mitigation from Offshore Wind Power Plants by Transmission Owners

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**Abstract :** In the UK, as the volume of non-linear loads connected to transmission grid continues to rise steeply, the harmonic distortion levels on transmission network are becoming a serious concern for the network owners and system operators. This paper outlines the findings of the study conducted to verify the proposal that the harmonic mitigation could be optimized and can be managed economically and effectively at the transmission network level by the Transmission Owner (TO) instead of the individual polluter connected to the grid. Harmonic mitigation studies were conducted on selected regions of the transmission network in England for recently connected offshore wind power plants to strategize and optimize selected harmonic filter options. The results - filter volume and capacity - were then compared against the mitigation measures adopted by the individual connections. Estimation ratios were developed based on the actual installed and optimal proposed filters. These estimation ratios were then used to derive harmonic filter requirements for future contracted connections. The study has concluded that a saving of 37% in the filter volume/capacity could be achieved if the TO is to centrally manage the harmonic mitigation instead of individual polluter installing their own mitigation solution.

**Keywords :** C-type filter, harmonics, optimization, offshore wind farms, interconnectors, HVDC, renewable energy, transmission owner

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