Suction Pile Technology for the Dudgeon Offshore Wind Farm
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ABSTRACT

The substation of the Dudgeon Offshore Wind Farm, which has been successfully installed in Q2-2016, is founded on a 4-legged jacket with suction piles. This particular application of suction piles is a novelty for UK waters, and was selected for being cost efficient compared to other solutions. In the Dudgeon project SPT Offshore was responsible for the design, fabrication and installation of the suction piles.

SUCTION PILE DESIGN PROCESS

Installation design
- Prediction of installation pressures based on CPT-method according DNV CN 30.4
- Calibrated based on SPT experience and field tests

Capacity design
- FEA of failure mechanism and bucket capacity using Plaxis 3D
- Analysis of non-linear soil – structure interaction
- Assessment of foundation response due to cyclic loading; no reduction in strength was found, while stiffness reduced by 50%

OFFSHORE INSTALLATION

- Suction-assisted penetration phase performed in less than 2 hours
- Final inclination of 0.01° at target penetration
- Required installation pressure at target penetration matches within 5% of prediction

CONCLUSIONS

Suction pile design requires balancing installation and in-place requirements. The Dudgeon offshore substation project has shown that suction piles can provide a cost-effective foundation solution. The suction pile installation process proved to be both fast and well predictable.

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