

Design drivers for buoyant gravity-based foundations (*Wind Energy*)

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<p>Abstract</p>	<p>Buoyant gravity-based foundations (GBFs) have been proposed as an alternative to conventional lifted GBFs, with the objective to negate the need for costly transportation vessels and thereby provide a more cost-effective foundation option. However, in order for the foundation to remain stable during float-out, towing and ballasting, the floatability and hydrodynamic stability of the foundation has to be proven. Maintaining hydrodynamic stability depends on many parameters, most importantly the foundation configuration, geometry and total weight, as well as water depth and ballasting sequence among other factors. This study investigates the performance of GBFs with various geometrical attributes during float-out and ballasting operations, using a parametric study with water depths ranging from 30 to 50 m. The impact of each parameter on the variation of metacentric height of the foundation during ballasting and the initial drafts at float-out was studied. The most suitable geometries for each water depth were investigated based on a preliminary analysis of the hydrodynamic stability. One limitation of this work is that the hydrodynamic wave forces acting on the foundation have not been considered—this is the subject of an ongoing experimental programme, which will be published in a follow-on paper. However, this paper does consider the geotechnical stability of gravity-based foundations and the potential modes of failure because of soil-structure interaction. Upper and lower ballast limits were quantified in order to satisfy the geotechnical stability requirements of the foundation for various combinations of water depth/ base diameter.</p>

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