

DEVELOPMENT OF A MULTI-USE TOPSIDE (AC/DC/H2) FOR A FLOATING OFFSHORE WIND FARM

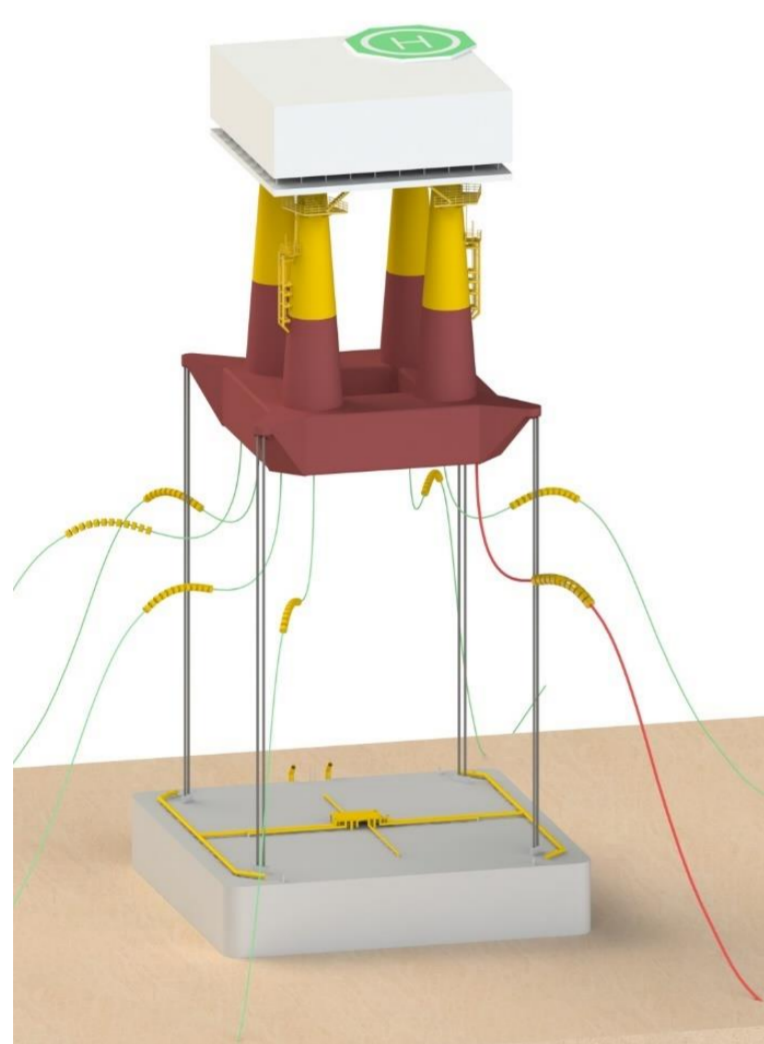
Summary of results as basis for a EU MarTERA Co-Fund project

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MOTIVATION

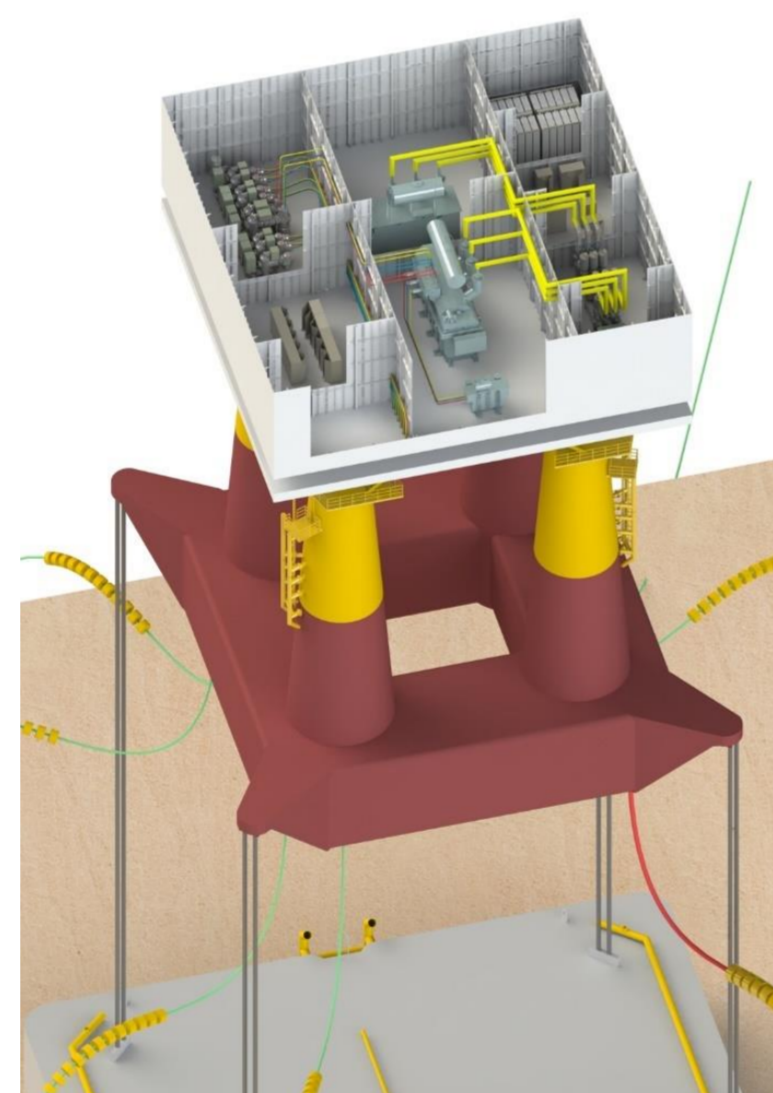
Substations usually consist of a topside, which houses the technical equipment (transformers, converters, etc.), and a substructure that carries the topside. Although, there are already several floating wind turbines with different substructures in operation, no full-scale floating substation for wind farms has been installed up to now. With the installation of large-scale floating wind parks in water depths of significantly more than 60 m in the next decade, floating platforms will become necessary for technical and economic reasons.

Existing, fixed substations are usually individual developments for specific wind farms. From an economic point of view and in order to significantly shorten the development time of future platforms, it makes sense to use standardised platform systems in the future, which can, however, be adapted to the specific site conditions.



Overall view

Internal view



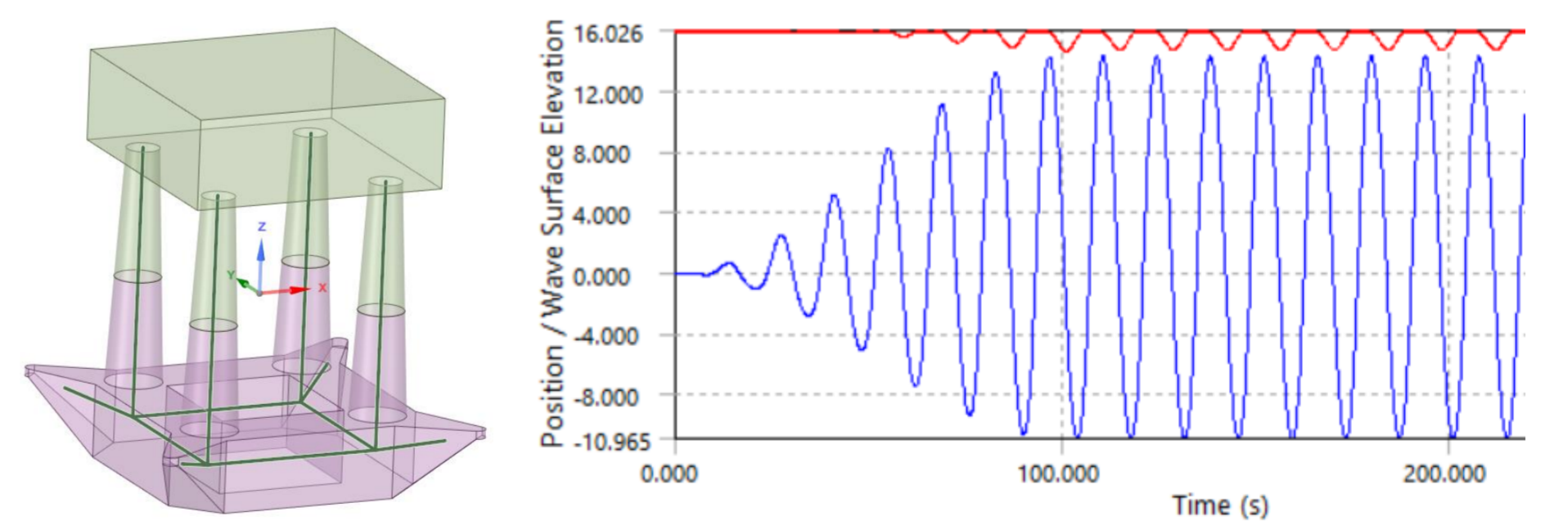
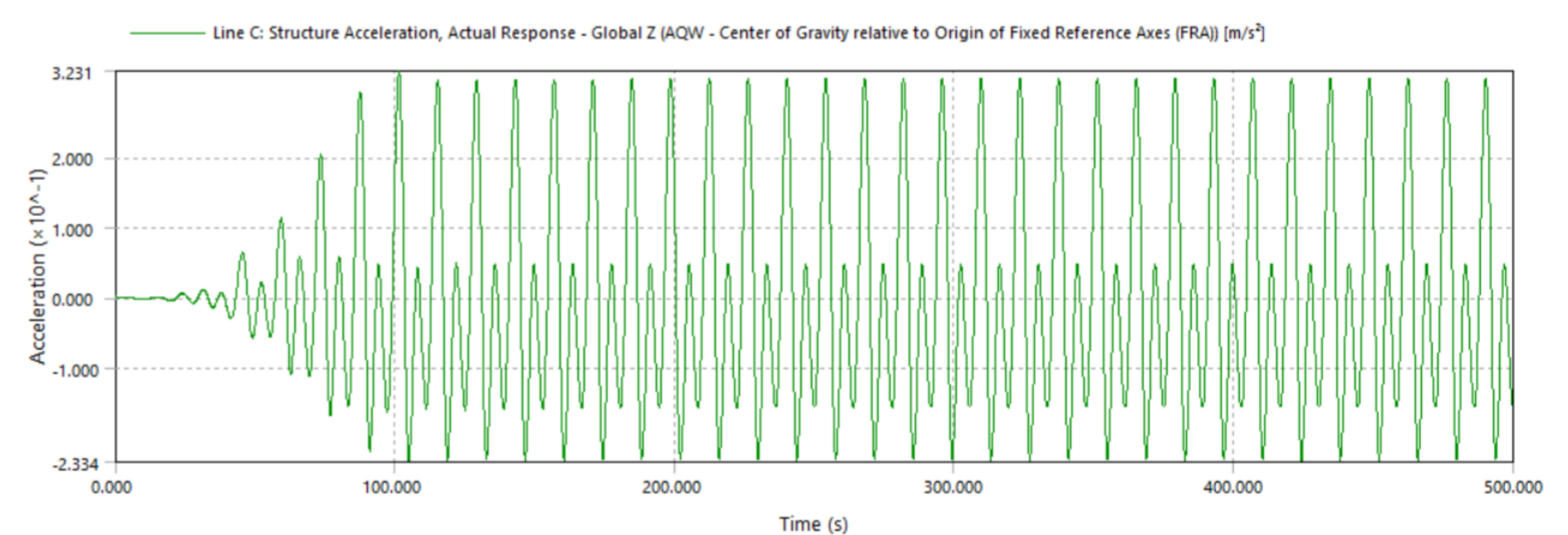
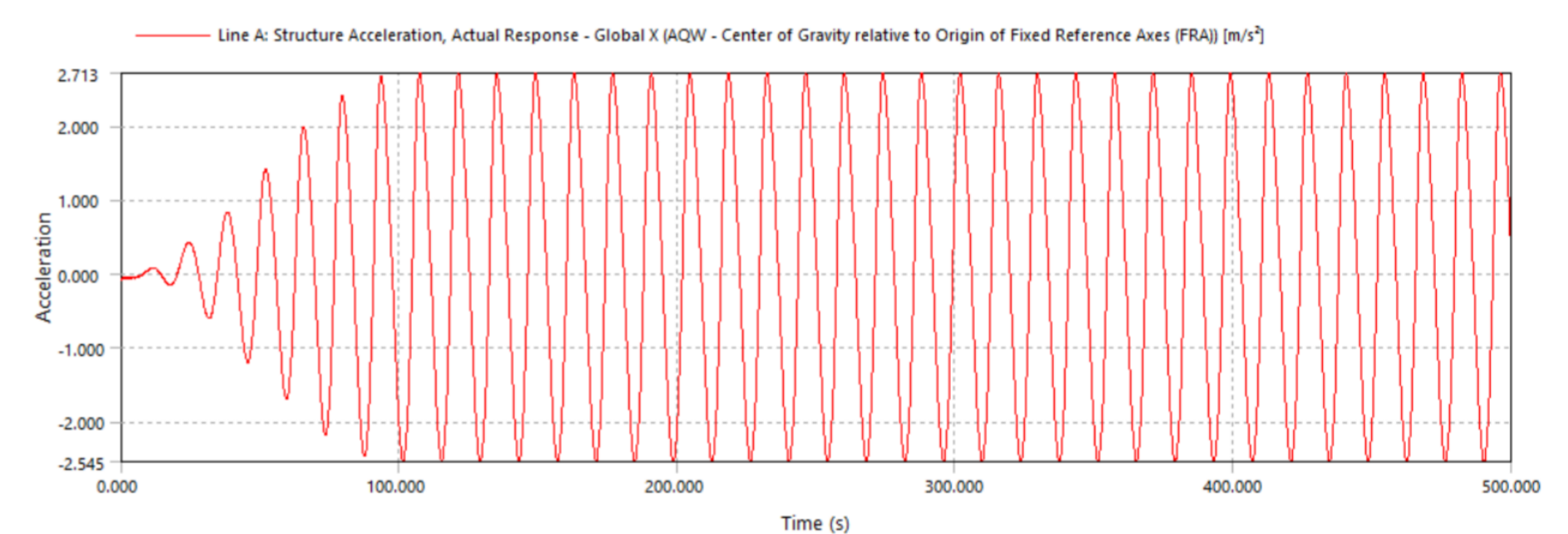
THE IDEA

GICON is developing an innovative design for a standardised, universal and modular (LEGO®) substation on a TLP substructure that enables (semi-)automated series production. The scalable platform concept allows customisation for different wind park sizes and metocean conditions, considering multiple purposes such as transformation of alternating current, conversion of alternating current to direct current as well as producing and storing hydrogen. Functionalities can be chosen depending on the usage including a combined use for multiple wind farms.

The platform design is based on a comprehensive design matrix including international codes and standards and different metocean and soil conditions, excluding sites with extreme conditions. Thus, the economic efficiency of the design is ensured as well as an in parts universal suitability for most sites. The new platform concept will have major improvements compared to state-of-the-art offshore substations and is expected to make a large part of the site-specific developments unnecessary in the future.

The economics of the new topside design are expected to be very attractive not only for floating applications but also for fixed wind farms. This aspect is addressed by a universal interface that allows modular topsides to be combined with floating and fixed substructures.

PRELIMINARY SYSTEM DYNAMIC



ACKNOWLEDGMENT

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DNV, Floating Substations: the next challenge on the path to commercial scale floating windfarms. URL <https://www.dnv.com/article/floating-substations-the-next-challenge-on-the-path-to-commercial-scale-floating-windfarms-199213>
Crown Estate Scotland, Crown Estate Scotland completes ScotWind Leasing review. 2021. URL <https://www.crownestatescotland.com/media-and-notice/news-media-releases-opinion/crown-estate-scotland-completes-scotwind-leasing-review>
GWEC – Global Wind Energy Council, Market Status 2019. 2020. URL <https://gwec.net/global-wind-report-2019/>
WindEurope, Wind energy in Europe in 2019. 2020. URL <https://windeurope.org/wp-content/uploads/files/about-wind/statistics/WindEurope-Annual-Statistics-2019.pdf>