Dear Sirs,

Subject: CRU/18/119 Consultation Paper – Greenlink Electricity Interconnector

With regard to the above Greenlink consultation paper published by CRU on the 18th June 2018, NKT wish to provide some comments specifically in relation to section 4.2.1 'CRU's initial observations on technical assessment' from an HVDC Cable System perspective.

NKT is one of the world's leading suppliers of high-voltage cable systems for submarine and underground power transmission applications, with over 60 years' experience in the field of HVDC cable systems.

We are familiar with the concept behind the Greenlink Interconnector having installed similar HVDC cable systems in the past and notably the 500MW East-West Interconnector that is currently in operation between UK and Ireland, rated at a voltage of ± 200kV DC.

Over 10,000km of extruded DC cable systems have been supplied globally since 1998, where the voltage levels contracted and in service are 80 kV, 150 kV, 200 kV and 320 kV.
When referring to cable systems, these comprise of cables, land joints, factory joints, submarine joints, repair joints and terminations. Voltage levels of 525 kV and 640 kV, which are based on the same design principles, have now also been qualified for extruded DC cable systems. This will facilitate HVDC interconnectors with even higher power transfer levels for cost-effective solutions.

Most supplied systems have been of the symmetric monopole type and some of the asymmetric monopole type, both of which have been in operation in a fully satisfactory manner.
Symmetric monopoles make use of two fully insulated cables (plus pole and minus pole) whereas an asymmetric monopole uses one fully insulated cable and a neutral, also referred to as the return cable.

A pole to ground failure in a symmetric monopole results in a temporary overvoltage on the healthy pole. This and other failures modes are known and currently covered by testing according to CIGRE and IEC, containing severe testing at 1.85 times the service voltage with a duration of 30 days and a number of surge tests at project defined levels. Both these categories of tests address the temporary overvoltage's.

Cable systems of a certain chosen voltage are therefore dimensioned to take care of such overvoltage's and have in normal cases not to be increased in voltage rating.
The choice of the voltage of the cable system is mainly related to the power to be transported, the acceptable level of losses, the relation between CAPEX and OPEX and network system aspects. As a general rule, considering a defined power transfer in MW, both the CAPEX and OPEX are reduced if a higher DC voltage level is chosen.

From a purely technical cable system perspective, 500MW can be achieved with a DC voltage in the range of ± 200 to ± 320 kV using proven technology.

We trust that this information may be considered as part of your overall assessment.

With regards,