

Question No.	Question	Response
1	Please could you confirm that only HVAC connected wind farms are being considered for this piece of work, not HVDC connected wind farms?	The study will focus on HVAC connected offshore wind farms.
2	The total budget seems quite tight if actual laboratory testing is going to be undertaken. Could you confirm that the actual laboratory testing is required, or if it is only the strategy that is required?	<p>The successful contractor should propose a strategy to the TWG and then conduct laboratory testing as part of the project.</p> <p>The aim of this work package is to provide a solution which fits the budget sufficiently. Where the bidder is not able to conduct laboratory testing under the provided budget, a strategy alone can be proposed and will be considered sufficient.</p> <p>The bidder should note that the development of a strategy for laboratory testing will be prioritised over laboratory testing; but the bidder will also be marked on the depth of works which can be included under this work package.</p>
3	For the laboratory testing, are there any opinions in terms of provision of the relay? This would need to be free issue as the budget would not cover procurement of a relay.	The TWG-E may be able to provide hardware and can be included by the bidder; however, sufficient contingency should be provided in the instance that this can not be provided to the contractor.
4	The timescale seems very long for a project of this budget. Please could further information be provided as to why the timescale needs to be 24 months?	The timescale of 24 months as part of the ITT acts as a guide and the bidder may choose to deviate from this timeframe where applicable. The bidder may find it advantageous to use the extended period to look for areas of contingency such as delay in relay provision etc.
5	Can you confirm for the wind farm modelling whether we would be given a black box wind turbine controller or be at liberty to use a generic controller, as, given the	The TWG-E may be able to provide generic models for the purpose of this study; however, the bidder should accommodate for contingency if this is not possible. Note that a simple model in itself is not sufficient as the model must be able to identify that chosen protection functions work. Part of delivery of WP1

	timescales, it may not be possible to get an OEM onboard?	should be to identify best level of model to allow suitable analysis of protection system.
6	You have mentioned the use of laboratory testing with relays- would you be amenable to the testing of novel algorithms through microprocessor implementation and appropriate equivalent custom hardware that would demonstrate the feasibility/effectiveness?	The bidder may propose the testing of novel algorithms through this the use of a microprocessor; however, they must provide evidence on feasibility and effectiveness. If this can be demonstrated better than what we have today with any hardware, it is preferential to the TWG.
7	In WP1 what should be investigated 'Before fault'? Is a transition between two grid conditions to be combined with a 'before fault' and 'after fault' event, e.g. following a grid fault the OWF may get islanded or connected to a weak grid instead of a strong grid?	Throughout WP1, before-fault (or pre-fault) should be considered as stable or normal operation as a basis. After fault, the OWF may get islanded or connected to a weak grid.
8	In WP1 what is the difference between Islanded Grid and Black Start grid conditions in terms of electrical assets being included or operational difference, and what would be the transition between both grid conditions?	<p>For the purpose of this project, islanded conditions would be considered unintentional disconnection where the operator/protection only has a short time period to operate and there is no advance notice.</p> <p>Black-start conditions would be considered as intentional where notice is given and the operator can ensure that the protection functions are ready to operate for this.</p> <p>The contractor should note that in black-start conditions, it is known that the condition is islanded. For conventional islanded mode without black start, there should be a way to detect that islanding is present.</p>

9	<p>In WP1 what fault locations are expected to be simulated as a minimum for each grid condition? In relation to this, what is/are the location(s) of the protection relay(s) to be investigated? Note that too many faults and protection relay locations would compromise the ability to deliver the work within a reasonable time scale and budget.</p>	<p>Part of project setup would be to agree between OWA/Contractor to determine the best locations for analysis. This aspect is open for the bidder to suggest; but guidance will be provided by the TWG-E following announcement of successful contractor. The bidder may propose how much they are willing to consider throughout the course of the project, and may suggest locations to look at.</p>
10	<p>In WP1, would it be acceptable to have a simplified WTG model based on an equivalent current limited voltage source, with maximum fault current (reactive and/or active) injection to be agreed with TWG-E, based on typical practical WTGs? We believe this would serve the purpose for protection studies, as PSCAD simulation with full representation of WTGs would be very time consuming, while it would only provide more representative results of control stability issues if a WTG OEM would be willing to provide a black box model of a grid forming and grid following WTG.</p>	<p>As above (Question 5)</p>