



NETWORKS



ESB NETWORKS' RESPONSE TO STAKEHOLDER FEEDBACK ON MV EGIP STANDARD MODULE SUBSTATION

ESB Networks' Response Paper

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1. Introduction

In order to support the Irish Government's National Climate Action Plan, ESB Networks needs to develop standard options to facilitate faster and optimised connection options for renewable and customer connections to our network.

As part of the Irish Government's National Climate Action Plan 2019, there are several targets within the Electricity sector that must be met by 2030 including "the development of up to 1.5 GW of grid scale solar energy, an increase in onshore wind capacity of up to 8.2 GW". As the generation market in Ireland is moving towards low carbon renewables, there has been a marked increase in smaller Independent Power Providers (IPPs) looking for connections to the electricity network. A significant number of Solar connections are expected to come on-stream from 2021.

As an IPP could have a solar farm constructed in a much shorter timeframe than, for example, a windfarm development, ESB Networks will have to deliver a Medium Voltage (MV) Embedded Generation Interface Protection (EGIP) Substation connection in a considerably shorter timeframe than our current standard. The aim of this project is to support the renewable energy generation industry in connecting to ESB Networks' MV network.

Over the past two years, ESB Networks have engaged with stakeholders involved in the renewable generation. These stakeholders varied from utilities in the United Kingdom, IPPs in Ireland to material vendors/retailers.

Based on discussions with all of the various stakeholders, ESB Networks published a consultation document ([DOC-010720-FUV](#)) on the ESB Networks public website in November 2020. As part of the public consultation process, from November 2020 to January 2021, ESB Networks sought feedback on our proposed MV EGIP Module Substation. The module will significantly reduce the time required on site for constructing and commissioning an ESB Networks MV substation while also standardising our MV EGIP design. During our open consultation, the project team held a webinar on Friday 11th December 2020.

Industry and other interested stakeholders participated in the webinar (approximately 40 attendees) to find out in greater detail what ESB Networks were proposing in terms of the standard module approach. This response paper details the Menti survey responses from webinar participants (section 2), ESB Networks' responses to stakeholder queries/proposals during both the webinar and the overall consultation (section 3) and finally our next steps in this project with the showcase module at the National Training Centre (NTC) in Portlaoise (section 4). The module showcase will be an opportunity for interested stakeholders to view our proposed standard module solution.

2. Webinar Menti Survey Results

During our webinar event on Friday 11th December 2020, through the use of Menti, participants were able to answer questions from the ESB Networks’ project team during the webinar. It was evident in the responses received that: there is significant interest from Solar Farm IPPs in the standard module option; and reduced construction time on site is noted as main benefit from standard module connection option.

What type of MV Generation are customers planning to construct in the next year

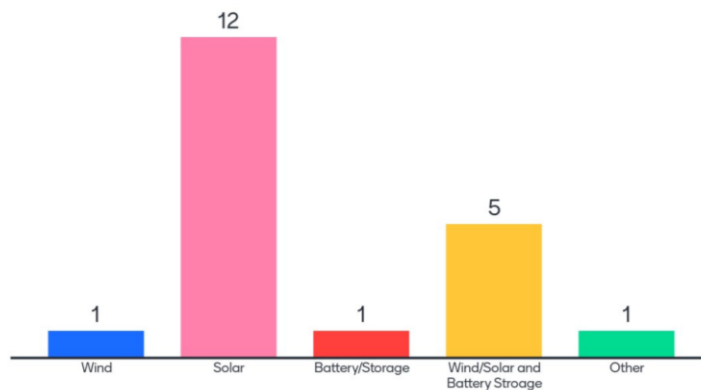


Figure 1 – Webinar Question 1

What number of sites are MV Generation Customers planning to construct, in the next year? (Please provide a number of MV Connection points)

Mentimeter



Figure 2 – Webinar Question 2

Do webinar attendees see benefits in our proposed solution and what are those benefits – Rank in order of preference

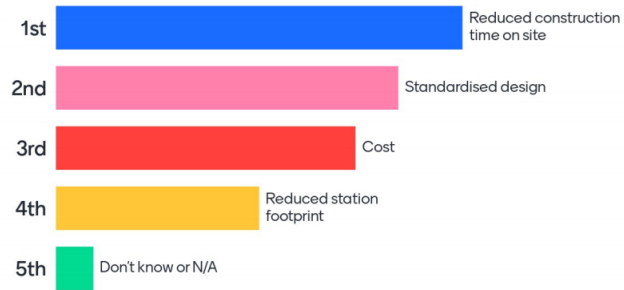


Figure 3 – Webinar Question 3

3. Stakeholder Questions and Answers

During the webinar, attendees asked specific questions which were answered by a panel of project members at the end of the main webinar presentation. Table 1 lists the questions stakeholders raised during the webinar and ESB Networks’ responses to them. We have also included responses to stakeholder feedback received in the overall consultation process.

Feedback Received	ESB Networks’ Response
<p>Any update for setback distance for OHL? – it is becoming critical for the solar industry as the plants are in the optimisation and procurement phases as we speak</p>	<p>During the webinar, the project team panel committed to reverting with a response on this query.</p> <p>The guideline clearance document “<i>Interim guideline clearances for solar farms to DSO overhead network</i>” has been published on ESB Networks’ public website. Please see link below:</p> <p>https://www.esbnetworks.ie/docs/default-source/publications/interim-guideline-clearances-for-solar-farm-to-dso-overhead-network.pdf?sfvrsn=cc2101f0_0</p>
<p>When do you expect the first module to be installed and commissioned at a generator site?</p>	<p>We aim to have a limited number of modules available for non-contestable projects towards the end of Q2 into early Q3 2021. If any IPP wants to consider the use of this module option, they will need to consider their existing planning permission and consents in place for the project.</p> <p>Please ensure that you make our Renewables Delivery Team aware of your intention to use a module so that we can ensure this is feasible.</p>
<p>Will the first module connection for a generator take place in 2021?</p>	<p>We aim to have a limited number of modules available for non-contestable projects towards the end of Q2 into early Q3 2021. If any IPP wants to consider the use of this module option, they will need to consider their existing planning permission and consents in place for the project.</p> <p>Please ensure that you make our Renewables Delivery Team aware of your intention to use a module so that we can ensure this is feasible.</p>
<p>Can you clarify if ESBN will supply and install the module, then contestability will only apply to the grid route for MV connections in the future ?</p>	<p>After successfully completing assembly of our showcase module, we are satisfied that non-contestable supply of this module will provide the optimum delivery solution to IPPs. We are confident that this will be at internationally tendered costs with no mark-up. ESB Networks holding a minimum supply stock of this module will ensure IPPs avoid supply delays thereby minimising project programme risk.</p> <p>It is our intention to propose to the Commission for Regulation of Utilities (CRU) that this MV EGIP Module Substation connection option be only provided through non-contestable connection method.</p>

	<p>If this is accepted, then grid route would be the only remaining contestable/non-contestable decision for the IPP to make.</p>
<p>Does that mean ESBN will be responsible for delivering the modular substation rather than the customer?</p>	<p>Yes. As noted above, it is our intention to propose to the CRU that this MV EGIP Module Substation connection option be only provided through non-contestable connection method as we believe this is the most favourable outcome for all parties.</p>
<p>What is the difference between EGIP and block built?</p>	<p>EGIP is Embedded Generation Interface Protection. It is the term used to describe generator connections to the MV Network. Both the planned new module and existing block built substation connection options are EGIP connections.</p>
<p>Solar Farms are normally enclosed inside a perimeter palisade fence for security, how is ESB access managed?</p>	<p>ESB Networks will agree access arrangements with the site operator. Typically, we would have an ESB Networks access/safety lock and chain linked in with the site operators gate lock.</p> <p>We require 24/7 emergency access to all our Substations from a public roadway. The standard wayleave and station land transfer process still applies.</p>
<p>We have planning for solar sites that have an option to have two containerised modules. Are we likely to go with that in 2021?</p>	<p>If your solar site has an existing network connection offer with planning consent, and you have the necessary module size/dimensions/layout detailed within your planning permission, please engage with us to discuss your project needs.</p> <p>Please ensure that you make our Renewables Delivery Team aware of your intention to use a module so that we can ensure this is feasible.</p>
<p>What's the design review process for these?</p>	<p>The purpose of the MV EGIP Standard Module Substation is to provide certainty to IPPs around a standard design and also meet the CRU's preference for ESB to provide modular solutions to our customers. Following an international review of modular installations in other utilities, we have finalised an MV EGIP design over the past two years which we are confident will meet the need of our IPP customers.</p> <p>As such, now that we are showcasing the MV EGIP Module there will not be a requirement to change or review the design per project.</p> <p>However, while this will be a standard connection option, there will of course be due diligence completed on each project to ensure they meet this connection design standard in line with ESB Networks project governance processes.</p>
<p>Do you have any earthing requirement for the plinth?</p>	<p>We are assessing earthing requirements at present with the construction of the showcase module ongoing. While our earthing requirements are being finalised at the time of writing this consultation, it is expected that similar requirements to the</p>

	<p>existing MV block built EGIP substation will be the design standard.</p> <p>We will confirm this with final design drawings and standards.</p>
<p>What are the lead-in times to ordering the modules?</p>	<p>It is ESB Networks intention to have floating stock of these modules so that long-lead order material, e.g. switchgear, does not result in minimum 6 month lead-in time.</p> <p>Assuming we have floating stock levels in place, the lead-in time will be <6 months and exact timeframe confirmed once we discuss this new module connection option detail with our material supply chain group. The exact lead-in time will be dependent upon the uptake from the industry.</p>
<p>What is the maximum distance allowed between the modular EGIP and the MV customer substation?</p>	<p>At present, ESB Networks and Customer rooms are immediately adjacent. We have not specified a maximum distance for this cable for the new module construction scenario as it may unnecessarily lead to issues in site construction where no system or site safety risk exists.</p> <p>The LV supply, signal cables and earthing must be adequately designed and rated for the demands of the module at the proposed distance.</p>
<p>Regarding Telecoms and lightning protection, what are the requirements?</p>	<p>Telecoms connectivity options are determined by site topology. We have allowed for telecoms antenna connection at the top of the module where necessary. Telecoms requirements within the ESB Networks module are determined by ESB Telecoms. Early engagement with ESB Telecoms is recommended to ensure telecoms site specific requirements can be implemented.</p> <p>There are of course earthing requirements and protection systems in place to deal with touch, step and transfer voltages and fault clearance times. The control wiring will be the same as the existing block built MV EGIP.</p>
<p>What are the earthing requirements for 10 kV and 20 kV</p>	<p>We are assessing earthing requirements at present with the construction of the showcase module ongoing. While our earthing requirements are being finalised at the time of writing this consultation, it is expected that similar requirements to the existing MV block built EGIP substation will be the design standard.</p> <p>We will confirm this with final design drawings and standards that will be made available when the limited stock is made available.</p>
<p>Timing on when this will actually be able to be implemented as a solution for developers. RESS 1 projects unlikely will be able to</p>	<p>We aim to have a limited number of modules available for non-contestable projects towards the end of Q2 into early Q3 2021. If any IPP wants to consider the use of this module option, they will need to consider their existing planning permission and consents in place for the project.</p>

<p>benefit. Will RESS 2 project benefit</p>	<p>We aim to upload planning layout drawings shortly for the module on our public website so that IPPs have can consider the module in future planning application submissions. We have also noted to the CRU our intention to introduce this module option as a new Generator Standard Charge (GSC) connection option and will work to have this new GSC established this year.</p>
<p>From my discussion with council fire officers. These units will not be exempt from building regulations. This could be problematic, in particular in terms of fire access. Has this been considered?</p>	<p>Building regulations do apply to these modules. The module will have to adhere to building regulations and has been designed to comply with them.</p>
<p>OHL setback /clearance distances – any updates? Would plants being deployed in 2021 have a chance to use this modular solution?</p>	<p>The guideline clearance document “<i>Interim guideline clearances for solar farms to DSO overhead network</i>” has now issued on ESB Networks’ public website. Please see link below: https://www.esbnetworks.ie/docs/default-source/publications/interim-guideline-clearances-for-solar-farm-to-dso-overhead-network.pdf?sfvrsn=cc2101f0_0</p>
<p>1.Are these proposed for contestable build projects/ if so will ESB provide these units at cost to the IPP? 2. What is the proposed Interface to the customer control wiring?</p>	<p>1. After successfully completing assembly of our showcase module, we are satisfied that non-contestable supply of this module will provide the optimum delivery solution to IPPs. We are confident that this will be at internationally tendered costs with no mark-up. ESB Networks holding a minimum supply stock of this module will ensure IPPs avoid supply delays thereby minimising project programme risk. It is our intention to propose to the CRU that this MV EGIP Module Substation connection option be only provided through non-contestable connection method. 2 The control wiring will be the same as the existing block built MV EGIP.</p>
<p>When spec is likely to be approved? When do you expect the first containerised substation to be built?</p>	<p>We aim to have a limited number of modules available for non-contestable projects towards the end of Q2 into early Q3 2021. If any IPP wants to consider the use of this module option, they will need to consider their existing planning permission and consents in place for the project. Please ensure that you make our Renewables Delivery Team aware of your intention to use a module so that we can ensure this is feasible.</p>

<p>How does the EGIP fit in with overall design (and drawings would be helpful) Costs – it looks like there is a big cost increase in the cost of the embedded generation interface protection (EGIP) for an MV connection I the standard Gen. Charges doc.</p>	<p>We will provide final design drawings and standards when the limited module stock is made available to non-contestable projects.</p> <p>The module will contain all of ESB’s equipment onsite that is present within an existing block built substation. However, it will remove the requirement for the IPP to build the block built substation.</p> <p>The Module will have a brand new Generator Standard Charge (GSC). The IPP will need to weigh up the cost of the module against the existing project construction cost of a block built substation. When considering these costs, there is of course the added significant benefit of reduced construction time on site to consider associated with the MV EGIP Module option.</p>
<p>1. Timelines for implementation. When will the first module be commissioned?</p> <p>2. Timelines for issuing of functional Specification for this module Substation?</p> <p>3. Configuration of IPP and ESBN substation. i.e. separate or joint module? Substation?</p>	<p>1. We aim to have a limited number of modules available for non-contestable projects towards the end of Q2 into early Q3 2021. If any IPP wants to consider the use of this module option, they will need to consider their existing planning permission and consents in place for the project.</p> <p>Please ensure that you make our Renewables Delivery Team aware of your intention to use a module so that we can ensure this is feasible.</p> <p>2. After successfully completing assembly of our showcase module, we are satisfied that non-contestable supply of this module will provide the optimum delivery solution to IPPs. We are confident that this will be at internationally tendered costs with no mark-up. ESB Networks holding a minimum supply stock of this module will ensure IPPs avoid supply delays thereby minimising project programme risk.</p> <p>It is our intention to propose to the CRU that this MV EGIP Module Substation connection option be only provided through non-contestable connection method.</p> <p>If this is accepted, then no functional specification would be required.</p> <p>3. The IPP and ESB Networks modules will be separate.</p>
<p>1. What would be the lead time on this module?</p> <p>2. Does this remove the need for the IPP switch room & Control room, or must these be provided separately? Windfarm controllers require CT/VT signals from IPP switchgear.</p>	<p>1. It is ESB Networks intention to have floating stock of these modules so that long-lead order material, e.g. switchgear, does not result in minimum 6 month lead-in time.</p> <p>Assuming we have floating stock levels in place, the lead-in time will be <6 months and exact timeframe confirmed once we discuss this new module connection option detail with our material supply chain group. The exact lead-in time will be dependent upon the uptake from the industry.</p>

	<p>2. No. the IPP will need to provide their own switch room / control room. ESBN will still require signals and supplies from the IPP</p>
<p>Can Connection offers with block built substations be modified to MV modules?</p>	<p>Yes. However, we would recommend customers consider their existing planning permission and overall project consents are not impacted if the connection type changes.</p> <p>Also, if a customer wishes to change their connection option/offer received they should engage with the Renewables Delivery Team to ensure all potential impacts upon the project are considered.</p>
<p>Will the ESB Modular building have a connected earthing system with the IPP building earthing design or is this kept separate?</p>	<p>We are assessing earthing requirements at present with the construction of the showcase module ongoing. While our earthing requirements are being finalised at the time of writing this consultation, it is expected that similar requirements to the existing MV block built EGIP substation will be the design standard.</p> <p>It is ESB Networks intention to have a standard design, ideally optimising by bonding IPP and Network MV earthing systems together.</p>
<p>What access will be required for the modular units? Can they be located in an underground car park for example?</p>	<p>ESB Networks will agree access arrangements with the site operator. Typically, we would have an ESB Networks access/safety lock and chain linked in with the site operators gate lock.</p> <p>We require 24/7 emergency access to all our Substations from a public roadway. The standard wayleave and station land transfer process still applies.</p> <p>ESB Networks would require that these modules be placed over ground and not in any enclosed space such as an underground room/car park. Ideally, these modules would be located at the roadside perimeter area of the site to facilitate ease of access.</p> <p>It is important to note that these modules are IPP generator connection options only and not demand customer designed connection options.</p>
<p>We maintain this approach should be adopted by the DSO with urgency and would make three further recommendations in relation to its implementation:</p> <ol style="list-style-type: none"> 1. Module substation contestability; 2. Design commonality; and 3. Inclusion of 38kV network 	<ol style="list-style-type: none"> 1. After successfully completing assembly of our showcase module, we are satisfied that non-contestable supply of this module will provide the optimum delivery solution to IPPs. We are confident that this will be at internationally tendered costs with no mark-up. ESB Networks holding a minimum supply stock of this module will ensure IPPs avoid supply delays thereby minimising project programme risk. <p>It is our intention to propose to the CRU that this MV EGIP Module Substation connection option be only provided through non-contestable connection method.</p>

	<ol style="list-style-type: none"> 2. A key aim of this module connection option is for design standardisation. We believe that the module connection option developed delivers that certainty for IPPs. 3. This project deals solely with MV EGIP connections and 24 kV rated switchgear. As noted during our webinar in December, a part of ESB Networks overall assessment of High Voltage (HV) and MV Modules includes a review of HV Module options employed on system reinforcement projects supporting renewable generation connections. We recognise IPPs preference for more module options. Upon completion of this EGIP module project, we will be providing further updates on HV Module developments.
<p>Module substations should be fully contestable. This will create investment in Ireland and generate market competition resulting in competitive pricing.</p> <p>Competitive pricing will deliver the best value for the end customer through cost-competitive electricity and optimal return on investment for taxpayers supporting renewable projects through RESS.</p>	<p>After successfully completing assembly of our showcase module, we are satisfied that non-contestable supply of this module will provide the optimum delivery solution to IPPs. We are confident that this will be at internationally tendered costs with no mark-up. ESB Networks holding a minimum supply stock of this module will ensure IPPs avoid supply delays thereby minimising project programme risk.</p> <p>It is our intention to propose to the CRU that this MV EGIP Module Substation connection option be only provided through non-contestable connection method.</p>
<p>There are several companies operating in the UK that have successfully installed module substations, almost identical to the design provided in the consultation document.</p> <p>We believe that a functional specification for the design of a standard module substation should be published by ESNB and that this specification should be neutral with respect to suppliers. This document would provide suppliers with a competitive route into the Irish market and drive down the cost of delivering renewable projects.</p>	<p>The purpose of the MV EGIP Standard Module Substation is to provide certainty to IPPs around a standard design and also meet the CRU's preference for ESB to provide modular solutions to our customers.</p> <p>Following an international review of modular installations in other utilities, we have finalised an MV EGIP design over the past two years which we are confident will meet the need of our IPP customers.</p> <p>We agree that there are module substations that are '<i>almost identical</i>' to our module design. Not having each module identical causes issues when trying to standardise an electricity substation design. When consulting with personnel installing MV modules in the UK, it was noted to ESB Networks that numerous different module designs, for one DNO, were adopted. As a result, there was not any one standard design in place. This, in ESB Networks opinion, goes against the aim of standardising designs. As such, we would not see the UK experience as directly transferrable to the Irish electricity system. We did however take account of the general positive impact of modules in connecting renewable generation to their MV Network.</p>

	<p>After successfully completing assembly of our showcase module, we are satisfied that non-contestable supply of this module will provide the optimum delivery solution to IPPs. We are confident that this will be at internationally tendered costs with no mark-up. ESB Networks holding a minimum supply stock of this module will ensure IPPs avoid supply delays thereby minimising project programme risk.</p> <p>It is our intention to propose to the CRU that this MV EGIP Module Substation connection option be only provided through non-contestable connection method.</p>
<p>Through our engagement with UK suppliers, we have been advised that the indoor switchgear for many of these substations is rated for 38-40kV. Therefore, module substations are suitable for use on the 38kV network and we believe the role out of module substations should be extended to include this part of network. This addition would result in faster and more cost-effective deployment of renewables across the entire distribution system.</p>	<p>This project deals solely with MV EGIP connections and 24 kV rated switchgear. As noted during our webinar in December, a part of ESB Networks overall assessment of High Voltage (HV) and MV Modules includes a review of HV Module options employed on system reinforcement projects supporting renewable generation connections. We recognise IPPs preference for more module options. Upon completion of this EGIP module project, we will be providing further updates on HV Module developments.</p>
<p>Has the option of a combined IPP and ESB modular unit been considered?</p>	<p>Yes. However, to proceed with a combined ESB Networks substation/customer switchroom would have limited the IPP's design/layout options. To provide a standard ESB Networks substation module solution to the industry we have proceeded with a module containing ESB Networks MV EGIP substation equipment.</p>
<p>Are the modular unit suppliers going to be restricted to an Approved ESB Suppliers List?</p>	<p>After successfully completing assembly of our showcase module, we are satisfied that non-contestable supply of this module will provide the optimum delivery solution to IPPs. We are confident that this will be at internationally tendered costs with no mark-up. ESB Networks holding a minimum supply stock of this module will ensure IPPs avoid supply delays thereby minimising project programme risk.</p> <p>It is our intention to propose to the Commission for Regulation of Utilities (CRU) that this MV EGIP Module Substation connection option be only provided through non-contestable connection method.</p> <p>If this is accepted, then grid route would be the only remaining contestable/non-contestable decision for the IPP to make.</p>

<p>Is the option of installing the module on a raised foundation acceptable?</p>	<p>Ideally, the floor level of the MV EGIP Module should be at or near ground level. This eliminates the need for steps, railing, raised platforms, etc. and enables ease of access during the entire operating lifecycle of the substation.</p> <p>As such, a vault or underground chamber is allowed for in our standard plinth design. We acknowledge that in poor ground conditions piled support or some form of additional foundation design needs to be considered. In these limited scenarios, the customer needs to ensure that an adequate foundation support is designed and installed that is capable of supporting the MV EGIP Module.</p>
<p>Is it acceptable to fully fit out the units with electrical equipment prior to delivery to site?</p>	<p>Yes. The ESB MV EGIP Substation will be fully fitted out before delivery to site. This is one of the main benefits of the module solution.</p>

Table 1 – Stakeholder queries received during consultation

4. Next Steps

ESB Networks invites all interested stakeholders to visit the showcase of the first module in Q2 2021. Our showcase module is being commissioned at the time of this report being compiled. Once the module is ready, we aim to have the showcase module delivered to site and available for inspection in June 2021.

Access to the showcase module will of course be reliant upon Covid19 restrictions in place when the module is on site. We will advise what precautions are necessary and ensure travel to Portlaoise is permitted when dealing with requests for access to the module.

For any additional information, or to request an invite to visit the module, please contact the innovation team via email: innovationfeedback@esbnetworks.ie