Stability Pathfinder Phase 2 Scotland

Feasibility Study Template V1

­

December 2020

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# 

1. Details

|  |  |
| --- | --- |
| Company name |  |
| Solution location(s) | *Please state all substation locations considered in this report* |
| **Number of options considered in this report** | *Please state all the options considered in this report (clearly stating which options relate to which substation locations)* |
| **Overview of option** | *Please include a brief description of the options covered in this report. Approx. 100 words per option* |

### Options location and technology

Please complete the table below to show which technologies are considered at which locations. The option names used/referred in the table should be referenced throughout the report.

Table 1: Options

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Technology 1** | **Technology 2** | **Technology 3** |  |
| **Location A** | *Option 1* |  |  |  |
| **Location B** | *Option 2* | *Option 5* |  |  |
| **Location C** | *Option 3* | *Option 6* |  |  |
| **Location D** | *Option 4* |  | *Option 7* |  |
|  |  |  |  |  |
|  |  |  |  |  |

1. Feasibility study tests results and discussion

## Test 1

**Steps 1-2 of Test 1 are required for minimum and maximum asset size per technology type.**

**Step 3 of Test 1 (Table 2 in this section) is required for all solutions for each technology type, rating and substation location.**

|  |  |
| --- | --- |
| Response Format | Text (no more than 500 words) and plots. The provider must:   * Insert time series plots from Test 1 showing short circuit current contribution for a 3 phase to earth fault at the point of study for the fault conditions described in the feasibility study guidance Test 1, clearly highlighting fault current at 100ms following the fault at the point of study. * State if there is any capping of the short circuit current output due to machine rating. * Describe how different SCL values affect the device's performance in the feasibility study tests. * Explain any limitation on the device meeting the feasibility study assessment criteria at different SCL values. * Using all plots from Test 1,   + - Show that the device injects reactive power for a retained voltage without the need for measurement as described in Test 1     - Show that the device injects or absorbs reactive power for post fault voltage of 0.9p.u and 1.1p.u without the need for measurement as described in Test 1     - Show reactive current response time of 5ms and injection/absorption levels proportional to the size of the voltage event. * Describe any capping of the reactive power output. |
| Attachments | *Please include the titles of any attachments associated to this section.* |
| **Response** |  |

**Table 1 is required for all solutions for each technology type, rating and substation location.**

**Copy this for each solution.**

*Please provide the instantaneous fault level in kA at 100 ms after a 3 phase to earth fault at the node stated, using the ESO declared retained voltages and the method set out in Test 1 of the feasibility study guidance.*

Table 2: Fault current contributions from Test 1

|  |  |
| --- | --- |
| **Node** | **Fault current injected into the point of study at 100ms after the fault (kA)** |
| **Point of study** |  |
| **Blackhillock 400kV** |  |
| **Eccles 400kV** |  |
| **Hunterston 400kV** |  |
| **Longannet 275kV** |  |
| **Peterhead 275kV** |  |
| **Spittal 275kV** |  |

## Test 2

**This test and section is required for all solutions for each technology type, rating and substation location.**

**Copy this section for each solution.**

|  |  |
| --- | --- |
| Response Format | Text (no more than 500 words) and plots. The provider must:   * + Insert time series plots of inertia response from simulations described in Test 2 of the feasibility study guidance.   + Show calculations of how inertia values relate to the plots of MW output and system frequency.   + State inertia value in MJ or MW.s as explained in the technical specification in Table 3 below.   + State if there is any capping of the inertia output due to device's rating. It must be demonstrated that any capping does not occur for a RoCoF of less than 1Hz/s.   + Show the solution provides inertia response starting within 5ms for all simulations.   + Describe how inertia is provided from the device, ensure that there is no requirement for measurement from the network to trigger the inertia.   + Identify any run modes or active power requirements (e.g. generation output, state of charge, etc.) that limit the provision of inertia.   + Demonstrate that the device can ride through any RoCoF events described in Test 2 of the feasibility study guidance. |
| Attachments | *Please include the titles of any attachments associated to this section.* |
| **Response** |  |

*Please provide the inertia constant and inertia value of your solution.*

Table 3: Inertia values

|  |  |
| --- | --- |
|  | **Value** |
| **Inertia constant H (s)** |  |
| **Inertia value (MW.s or MJ)** |  |

## Test 3

**This test and section is required for minimum and maximum asset size per technology type.**

|  |  |
| --- | --- |
| Response Format | Text (no more than 500 words) and plots. The provider must:   * + Show all plots from Test 3 of the feasibility study guidance.   + Show that there is a response in active and/or reactive power within 5ms following a phase angle change.   + Explain any limitations in withstanding and providing support for the angle changes in Test 3 of the feasibility study guidance. |
| Attachments | *Please include the titles of any attachments associated to this section.* |
| **Response** |  |

## Test 4

**This test and section is required for minimum and maximum asset size per technology type.**

|  |  |
| --- | --- |
| Response Format | Text (no more than 500 words) and plots. The provider must:   * + Using all plots from Test 4, show the device injects or absorbs reactive current for combined voltage and frequency events described in Test 4.   + Describe any capping of the reactive/active power output. |
| Attachments | *Please include the titles of any attachments associated to this section.* |
| **Response** |  |

## Test 5

**This test and section is required for minimum and maximum asset size per technology type.**

|  |  |
| --- | --- |
| Response Format | Text (no more than 500 words). The provider must:   * Using plots from test 5, explain how solution responds to repeated events as described in Test 5 of the feasibility study guidance. * Describe any limitations to providing repeated performance. |
| Attachments | *Please include the titles of any attachments associated to this section.* |
| **Response** |  |

3. Feasibility study assumptions

|  |  |
| --- | --- |
| Response Format | For the proposed solutions(s) provide   * Diagram of simulation network used for feasibility study clearly marking point of study and solution. * State study assumptions mentioned in the feasibility study guidance such as   + The pre-fault voltage at the point of study should be at 1 p.u.   + The time step resolution should not be greater than 5 ms and must clearly show current values pre-fault, during fault and post fault periods for up to a period of reaching post fault steady state.   + Simulations are performed in EMT analysis.   + Site specific network SCL values used for which test/solution.   + Asset/solution parameters relevant to modelling. |
| Attachments | *Please include the titles of any attachments associated to this section.* |
| **Response** |  |

4. List of Appendices / Attachments

Study results for all tests described in the feasibility guidance should be submitted along with this report and listed below.

|  |  |  |
| --- | --- | --- |
| Appendix  Num. | Document | File name as submitted |
| 1 | E.g Solution A results excel |  |
| 2 | E.g Solution B results excel |  |
| 3 | E.g Solution C results excel |  |
| 4 |  |  |
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