EIRGRID_2015 Functional Document Template (21

DSU MW Capacity

24 Hour Aggregate test

[Insert Name]

Version 3.0

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# Document Version History

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# Introduction

The DSU must submit the latest version of this test procedure as published on the EirGrid website[[1]](#footnote-1). The test procedure shall be submitted to and approved by [DSU@eirgrid.com](mailto:DSU@eirgrid.com) not less than 10 business days in advance of the proposed test date.

All yellow sections must be filled in before the test procedure will be approved. All grey sections must be filled in during testing. If any test requirements or steps are unclear, or if there is an issue with meeting any requirements or carrying out any steps, please contact [DSU@eirgrid.com](mailto:DSU@eirgrid.com).

On the day of testing, suitably qualified technical personnel will be needed at the DSU control centre to assist and execute the tests as per the test procedure. Such personnel shall have the ability to fully understand the function of each individual site(s) during demand reduction and the relationship the site(s) to the network to which it is connected. In addition the function of the technical personnel will be to liaise with the individual demand sites or NCC as required.

On the day of the test, NCC will determine:

1. If network conditions allow the testing to proceed.
2. Which tests will be carried out?
3. When the tests will be carried out.

All new individual demand sites included within the DSU application shall be available for the test. The DSU shall liaise with the DSO as appropriate.

Following testing, the following shall be submitted to [DSU@eirgrid.com](mailto:DSU@eirgrid.com):

|  |  |
| --- | --- |
| **Submission** | **Timeline** |
| A scanned copy of the test procedure, as completed and signed on site on the day of testing | 1 working day |
| Test data in CSV or Excel format  (metered data from all meters installed at each IDS, RTU data) | 1 working day |
| Test report | 10 working days |

# Abbreviations

DSO Distribution System Operator

DSU Demand Side Unit

EDIL Electronic Dispatch Instruction Logger

IDS Individual Demand Site

MEC Maximum Export Capacity

MPRN Metering Point Registration Number

MRSO Meter Readings Service Operator

Mvar Mega Var

MW Mega watt

NCC National Control Centre

SCADA Supervisory Control and Data Acquisition

TSO Transmission System Operator

# Operational Data

## DSU

|  |  |
| --- | --- |
| DSU Name | DSU to specify |
| DSU Test Coordinator and contact Number | DSU to Specify |
| DSU Control Centre Location | DSU to Specify |
| DSU Notice Time (min) | DSU to Specify |
| DSU MW Response Time (min) | DSU to Specify |

## Operational Data for Individual Demand Sites Under Test

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Individual Demand Site Name/Number** |  | Individual demand site no. 1 | Individual demand site no. 2 | Individual demand site no. n |
| **MPRN** |  | DSU to specify | DSU to specify | DSU to specify |
| **MIC** | **MW** | DSU to specify | DSU to specify | DSU to specify |
| **MEC** | **MW** | DSU to specify | DSU to specify | DSU to specify |
| **MW Capacity (expected)** | **MW** | DSU to specify | DSU to specify | DSU to specify |
| **Demand Reduction Capability - Avoided Consumption** | **MW** | DSU to specify | DSU to specify | DSU to specify |
| **Demand Reduction Capability - On Site Generation (Continuous Parallel Mode or Shaving Mode)** | **MW** | DSU to specify | DSU to specify | DSU to specify |

# Grid Code References

|  |  |
| --- | --- |
| Grid Code Version: | DSU shall specify |

CC.7.4 Each **Demand Side Unit** shall, as a minimum, have the following capabilities:

1. Able to provide **Demand Side Unit MW Response** between0 MW and the **Demand Side Unit MW Capacity;**
2. **Maximum Ramp Up Rate** not less than 1.67% per minute of **Demand Side Unit MW Response** as specified in the **Dispatch Instruction;**
3. **Maximum Ramp Down Rate** not less than 1.67% per minute of **Demand Side Unit MW Response** as specified in the **Dispatch Instruction;**
4. **Minimum Down Time** not greater than 30 minutes;
5. **Maximum Down Time** not less than 2 hours**;**
6. **Minimum off time** not greater than 2 hours; and
7. **Demand Side Unit MW Response Time** of not greater than 1 hour.



CC.12.2 Signals and indications required to be provided by **Users** will include but shall not be limited to the following:

*(m), (n), (o), (p), (q), (r), (s) and (t)* are applicable to **Demand Side Unit Operators** who represent a **Demand Side Unit:**

(m) **Demand Side Unit MW Response** from **Generation** operating in **Continuous Parallel Mode** or **Shaving Mode**;

(n) **Demand Side Unit MW Response** from avoided **Demand** consumption and **Generation** operating in **Lopping Mode**, **Standby Mode** or **Automatic Mains Failure Mode;**

(o) Remaining **Demand Side Unit MW Availability**;

(p) **Demand Side Unit MW Response** from each **Individual Demand Site** with a **Demand Side Unit MW Capacity** of greater than or equal to 5 **MW**;

(q) **MW Output** from **Generation Units** with a **Capacity** greater than or equal to 5 MW;

(r) **Mvar Output** from **Generation Units** with a **Capacity** greater than or equal to 5 **MW** at **Individual Demand Sites** with a **Maximum Export Capacity** specified in the **Connection Agreement** or **DSO Connection Agreement** as applicable, as required by the TSO;

(s) Aggregate **MW Output** from **Generation Units** with a combined **Capacity** of greater than or equal to 5 **MW** on an **Individual Demand Site**, as required by the TSO; and

(t) **Demand Side Unit MW Response** from each **Individual Demand Site** that comprises the **Demand Side Unit**, as required by the TSO.

CC.12.6 **Demand Side Unit Operators** and **Generator Aggregators** shall provide the **TSO** the specification of the method of aggregation of SCADA from multiple sites. The minimum specifications shall be agreed with the **TSO** in advance and shall include:

1. signals from **Demand Side Unit Operators** shall be relayed to the **TSO Telecommunication Interface Cabinet** which reflect the **Demand Side Unit MW Response** to an accuracy of within 1 **MW** of the actual **Demand Side Unit MW Response** within 15 seconds of change occurring to the **Demand Side Unit MW Response**;

# Site Requirements for Control centre

The following is required if the EirGrid witness is attending the DSU site or control centre:

|  |  |
| --- | --- |
| Personal Protective Equipment Requirements   1. Site Safety boots 2. Hard Hat with chin strap 3. Hi Vis 4. Arc Resistive clothing 5. Safety Glasses 6. Gloves 7. Safe Pass | 1. Yes / No 2. Yes / No 3. Yes / No 4. Yes / No 5. Yes / No 6. Yes / No 7. Yes / No |
| Site Induction requirements | Yes / No  (If Yes, DSU to specify how and when the induction must carried out) |
| Any further information | DSU to specify |

# Test Description and Pre Conditions

## Purpose of the Test

The purpose of this test is to demonstrate the DSU MW for the individual demand sites that forms part of the aggregated DSU can meet the DSU Grid Code Requirements as specified within the Grid Code. This procedure is specific for DSUs which comprise aggregated generating units which run for an extended period of time as opposed to 2 hours. The IDS’s are required to run for period of 24 hours.

## Pass Criteria

The following is the pass criteria for the test. Any subsequent report for this test will be assessed against each of these criteria.

1. Able to provide DSU MW Response between 0 MW and the DSU MW Capacity.
2. Maximum Ramp Up Rate not less than 1.67% per minute of DSU MW Response as specified in the Dispatch Instruction.
3. Maximum Ramp Down Rate not less than 1.67% per minute of DSU MW Response as specified in the Dispatch Instruction.
4. Minimum Down Time not greater than 30 minutes.
5. Maximum Down Time not less than 24 hours.
6. Minimum Off Time not greater than 2 hours.
7. DSU MW Response Time of not greater than 1 hour.
8. Signals as specified in CC.12.2 are correct as per signal list.
9. DSU control centre receives all online dispatch instructions from NCC.
10. DSU communications system operates for each of the DSUs.
11. DSU commences implementation of dispatch instruction after the DSU Notice Time.
12. DSU responds to the MW instruction no later than the DSU MW response time.
13. The demand reduction capacity of individual demand sites without an MEC will be analysed accounting for the average of 4 quarter hour intervals using MRSO data in advance of the dispatch instruction. The difference between the average pre-dispatch level and the sustained uncontrollable load during dispatch over 24 hours shall be deemed the demand reduction capacity.

## Instrumentation and Onsite Data Trending

All of the following trends must be recorded by the DSU during the test. Failure to provide any of these trends will result in test cancellation.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Data Trending and Recording** | **Data sample resolution** | **Accuracy** | **Check On Day Of Test** |
| 1 | Total MW reduction Availability of DSU | DSU to Specify | DSU to Specify | Yes / No |
| 2 | Total MW Reduction achieved from Generation | DSU to Specify | DSU to Specify | Yes / No |
| 3 | Total MW Reduction achieved from Demand Reduction | DSU to Specify | DSU to Specify | Yes / No |
| 4 | Onsite Generation MW, SITE NAME Generator #1 | DSU to Specify | DSU to Specify | Yes / No |
| 5 | Demand Reduction MW, SITE NAME #1 | DSU to Specify | DSU to Specify | Yes / No |
| 6 | IDS1 Main Incomer | DSU to Specify | DSU to Specify | Yes / No |
| 7 | IDS1 Monitored Load | DSU to Specify | DSU to Specify | Yes / No |
| 8 | IDS2 Main Incomer | DSU to Specify | DSU to Specify | Yes / No |

## Pre Test Conditions

Should “No” be answered by the DSU to any of the following conditions, the test will not proceed.

|  |  |  |
| --- | --- | --- |
| **No.** | **Conditions** | **Check on day of test** |
| 1 | Pre Grid Code Check Certificate is ticked, signed, scanned and sent and accepted by [DSU@eirgrid.com](mailto:DSU@eirgrid.com). | Yes / No |
| 2 | All sites being tested have successfully completed a signals test and shall be relayed by the DSU communications system via SCADA to NCC. | Yes / No |
| 3 | Test Profiles have been submitted and approved by [neartime@eirgrid.com](mailto:neartime@eirgrid.com). | Yes / No |
| 4 | PN changes had been submitted via MPI (with Test Flag), NCC contacted and changes approved. | Yes / No |

## Pre Test Checks

|  |  |  |
| --- | --- | --- |
| **No.** | **Conditions** | **Check on day of test** |
| 1 | All Individual demand sites to be tested (listed in Section 4.2) are available for dispatch | Yes / No |
| 2 | Number of individual demand sites being tested:  (Record details of any sites not being tested in Comments Section) | \_\_\_\_\_\_\_\_ |
| 3 | Total DSU MW response expected during test:   * Generation * Demand Reduction | \_\_\_\_\_\_\_\_ MW  \_\_\_\_\_\_\_\_ MW |
| 4 | EDIL will be used for dispatch instructions from NCC during the test. | Yes / No |
| 5 | If EDIL is used for the test the DSU shall inform [datafeeds@eirgrid.com](mailto:GRMdatafeeds@eirgrid.com) with details of MW and date and time of the test. This shall be completed the day before the test.  EirGrid GRM Datafeeds informed: | Yes / No |

# Test Steps

## Demonstration of MW Capacity

| **Step No.** | **Action** | | **Event Time Expected by the DSU** | **Event Time** | **Comments** |
| --- | --- | --- | --- | --- | --- |
| 1 | DSU begins data recording for all trends noted in Section 7.3 above (min. 60 minutes before the EDIL Issue Time in the step 4). | | \_\_\_\_ : \_\_\_\_ |  | Time: \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 2 | Pre-dispatch demand | |  |  | Start Time: \_\_\_\_\_\_\_\_\_\_\_\_\_  End Time: \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 3 | DSU requests permission from NCC to proceed with the Aggregate DSU MW Capacity Test (before T=0[[2]](#footnote-2)).  DSU confirms and notes the following with NCC:   1. Total MW Reduction Availability of DSU. 2. Total MW Reduction Achieved from Demand Reduction. 3. Total MW Reduction Achieved from Generation. 4. Onsite Generation MW from site, SITE NAME #1. 5. Demand Reduction MW, SITE NAME #1.   Expected time of the next data entry: | | \_\_\_\_ : \_\_\_\_ |  | NCC DSU   1. \_\_\_\_\_ MW \_\_\_\_\_ MW 2. \_\_\_\_\_ MW \_\_\_\_\_ MW 3. \_\_\_\_\_ MW \_\_\_\_\_ MW 4. \_\_\_\_\_ MW \_\_\_\_\_ MW 5. \_\_\_\_\_ MW \_\_\_\_\_ MW   Time: \_\_\_\_\_\_\_\_\_ |
| 4 | (Insert DSU Notice Time) minutes before the DSU is to begin ramping, the DSU requests NCC to issue via EDIL a dispatch instruction of **XX MW** for XX1 DSU with an Effective Time of when the DSU is to begin ramping (T=0+Notice Time). | | \_\_\_\_ : \_\_\_\_ |  | Issue Time: \_\_\_\_\_\_\_\_\_\_  Effective Time: \_\_\_\_\_\_\_\_\_\_  MW:\_\_\_\_\_\_\_\_  Test Flag: Yes / No |
| 5 | DSU control room operator dispatches the individual demand sites, so that the DSU MW Response begins to ramp at the Dispatch Instruction Effective Time. | | \_\_\_\_ : \_\_\_\_ |  | Ramp begins at: \_\_\_\_ |
| 6 | When DSU MW response was achieved (T=1), note the following:   1. Time that DSU MW Response was achieved 2. Time of next MRSO quarter hour interval (Start of Maximum Down Time) 3. Time of Maximum Down Time completion (+96 MRSO quarter hour intervals) | | \_\_\_\_ : \_\_\_\_ |  | 1. \_\_\_\_\_\_\_\_ 2. \_\_\_\_\_\_\_\_ 3. \_\_\_\_\_\_\_\_ |
| 7 | DSU confirms and notes the following with NCC at (T=1):   1. Total MW Reduction Availability of DSU. 2. Total MW Reduction Achieved from Demand Reduction. 3. Total MW Reduction Achieved from Generation. 4. Onsite Generation MW, SITE NAME Generator #1. 5. Demand Reduction MW, SITE NAME #1.   Expected time of the next data entry: | | \_\_\_\_ : \_\_\_\_ |  | NCC DSU   1. \_\_\_\_\_ MW \_\_\_\_\_ MW 2. \_\_\_\_\_ MW \_\_\_\_\_ MW 3. \_\_\_\_\_ MW \_\_\_\_\_ MW 4. \_\_\_\_\_ MW \_\_\_\_\_ MW 5. \_\_\_\_\_ MW \_\_\_\_\_ MW   Time: \_\_\_\_\_\_\_\_\_ |
| 8 | DSU confirms and notes the following with NCC at (T=2):   1. Total MW Reduction Availability of DSU. 2. Total MW Reduction Achieved from Demand Reduction. 3. Total MW Reduction Achieved from Generation. 4. Onsite Generation MW, SITE NAME Generator #1. 5. Demand Reduction MW, SITE NAME #1.   Expected time of the next data entry: | | \_\_\_\_ : \_\_\_\_ |  | NCC DSU   1. \_\_\_\_\_ MW \_\_\_\_\_ MW 2. \_\_\_\_\_ MW \_\_\_\_\_ MW 3. \_\_\_\_\_ MW \_\_\_\_\_ MW 4. \_\_\_\_\_ MW \_\_\_\_\_ MW 5. \_\_\_\_\_ MW \_\_\_\_\_ MW   Time: \_\_\_\_\_\_\_\_\_ |
| 9 | DSU confirms and notes the following with NCC at (T=2+x):   1. Total MW Reduction Availability of DSU. 2. Total MW Reduction Achieved from Demand Reduction. 3. Total MW Reduction Achieved from Generation. 4. Onsite Generation MW, SITE NAME Generator #1. 5. Demand Reduction MW, SITE NAME #1.   Expected time of the next data entry: | | \_\_\_\_ : \_\_\_\_ |  | NCC DSU  1.\_\_\_\_\_\_ MW \_\_\_\_\_\_ MW  2.\_\_\_\_\_\_ MW \_\_\_\_\_\_ MW  3.\_\_\_\_\_\_ MW \_\_\_\_\_\_ MW  4.\_\_\_\_\_\_ MW \_\_\_\_\_\_ MW  5.\_\_\_\_\_\_ MW \_\_\_\_\_\_ MW  Time: \_\_\_\_\_\_\_\_\_ |
|  |  | **Next Day** | | | |
| 10 | DSU confirms and notes the following with NCC at (T=25):   1. Total MW Reduction Availability of DSU. 2. Total MW Reduction Achieved from Demand Reduction. 3. Total MW Reduction Achieved from Generation. 4. Onsite Generation MW, SITE NAME Generator #1. 5. Demand Reduction MW, SITE NAME #1.   Expected time of the next data entry: | | \_\_\_\_ : \_\_\_\_ |  | NCC DSU   1. \_\_\_\_\_ MW \_\_\_\_\_ MW 2. \_\_\_\_\_ MW \_\_\_\_\_ MW 3. \_\_\_\_\_ MW \_\_\_\_\_ MW 4. \_\_\_\_\_ MW \_\_\_\_\_ MW 5. \_\_\_\_\_ MW \_\_\_\_\_ MW   Time: \_\_\_\_\_\_\_\_\_ |
| 11 | (insert DSU Notice Time) minutes before DSU is to begin ramping, the DSU requests NCC to issue via EDIL a dispatch instruction of **0 MW** for XX1 DSU with an Effective Time of when the DSU is to begin ramping (T=25). | | \_\_\_\_ : \_\_\_\_ |  | Maximum Down Time must be demonstrated as at least 24 hours  Issue Time: \_\_\_\_\_\_\_\_\_\_\_\_  Effective Time: \_\_\_\_\_\_\_\_\_\_  Test Flag: Yes / No |
| 12 | DSU control room operator dispatches the individual demand sites, so that the DSU MW Response begins to ramp at the Dispatch Instruction Effective Time (T=25). | | \_\_\_\_ : \_\_\_\_ |  |  |
| 13 | Following down time of >= 24 hours, DSU MW Response begins ramping to 0 MW, at the Dispatch Instruction Effective Time. | | \_\_\_\_ : \_\_\_\_ |  | Ramp begins at: \_\_\_\_\_\_\_\_ |
| 14 | When **0 MW** response is achieved the DSU confirms and notes the following with NCC (T=27):   1. Total MW Reduction Availability of DSU. 2. Total MW Reduction Achieved from Demand Reduction. 3. Total MW Reduction Achieved from Generation. 4. Onsite Generation MW, SITE NAME Generator #1. 5. Demand Reduction MW, SITE NAME #1.   Expected time of the next data entry: | | \_\_\_\_ : \_\_\_\_ |  | NCC DSU   1. \_\_\_\_\_ MW \_\_\_\_\_ MW 2. \_\_\_\_\_ MW \_\_\_\_\_ MW 3. \_\_\_\_\_ MW \_\_\_\_\_ MW 4. \_\_\_\_\_ MW \_\_\_\_\_ MW 5. \_\_\_\_\_ MW \_\_\_\_\_ MW   Time: \_\_\_\_\_\_\_\_\_ |
| 15 | (insert DSU Notice Time) minutes before DSU is to begin ramping, the DSU requests NCC to issue via EDIL a dispatch instruction of **XX MW** for XX1 DSU with an Effective Time of when the DSU is to begin ramping. | | \_\_\_\_ : \_\_\_\_ |  | The Minimum Off Time must be demonstrated as less than 2 hours.  Minimum Off Time: \_\_\_\_\_\_\_mins.  Issue Time: \_\_\_\_\_\_\_\_\_\_\_  Effective Time: \_\_\_\_\_\_\_\_\_\_  Test Flag: Yes / No |
| 16 | DSU control room operator dispatches the individual demand sites, so that the DSU MW Response begins to ramp at the Dispatch Instruction Effective Time. (T=27+Notice Time) | | \_\_\_\_ : \_\_\_\_ |  |  |
| 17 | Following Off Time of <= 120 minutes, DSU MW Response begins ramping to **XX MW**, at the Dispatch Instruction Effective Time. | | \_\_\_\_ : \_\_\_\_ |  | Ramp begins at: \_\_\_\_\_\_\_\_ |
| 18 | When **XX MW** response is achieved the DSU confirms and notes the following with NCC (T=28):   1. Total MW Reduction Availability of DSU. 2. Total MW Reduction Achieved from Demand Reduction. 3. Total MW Reduction Achieved from Generation. 4. Onsite Generation MW, SITE NAME Generator #1. 5. Demand Reduction MW, SITE NAME #1.   Expected time of the next data entry: | | \_\_\_\_ : \_\_\_\_ |  | NCC DSU   1. \_\_\_\_\_ MW \_\_\_\_\_ MW 2. \_\_\_\_\_ MW \_\_\_\_\_ MW 3. \_\_\_\_\_ MW \_\_\_\_\_ MW 4. \_\_\_\_\_ MW \_\_\_\_\_ MW 5. \_\_\_\_\_ MW \_\_\_\_\_ MW   Time: \_\_\_\_\_\_\_\_\_ |
| 19 | (insert DSU Notice Time) minutes before DSU is to begin ramping, the DSU requests NCC to issue via EDIL a dispatch instruction of **0 MW** for XX1 DSU with an Effective Time of when the DSU is to begin ramping. | | \_\_\_\_ : \_\_\_\_ |  | The Minimum Down Time must be demonstrated as not greater than 30 minutes.  Minimum Down Time: \_\_\_\_\_mins.  Issue Time: \_\_\_\_\_\_\_\_\_\_\_  Effective Time: \_\_\_\_\_\_\_\_\_\_\_\_­  Test Flag: Yes / No |
| 20 | DSU control room operator dispatches the individual demand sites, so that the DSU MW Response begins to ramp at the Dispatch Instruction Effective Time.(T=28+Notice Time) | | \_\_\_\_ : \_\_\_\_ |  |  |
| 21 | Following down time of <= 30 minutes, DSU MW Response begins ramping to 0 MW, at the Dispatch Instruction Effective Time. | | \_\_\_\_ : \_\_\_\_ |  | Ramp begins at: \_\_\_\_\_\_ |
| 22 | When **0 MW** response is achieved the DSU confirms and notes the following with NCC (After T=29):   1. Total MW Reduction Availability of DSU. 2. Total MW Reduction Achieved from Demand Reduction. 3. Total MW Reduction Achieved from Generation. 4. Onsite Generation MW SITE NAME #1. 5. Demand Reduction MW, SITE NAME #1.   Expected time of the next data entry: | |  |  | NCC DSU   1. \_\_\_\_\_ MW \_\_\_\_\_ MW 2. \_\_\_\_\_ MW \_\_\_\_\_ MW 3. \_\_\_\_\_ MW \_\_\_\_\_ MW 4. \_\_\_\_\_ MW \_\_\_\_\_ MW 5. \_\_\_\_\_ MW \_\_\_\_\_ MW   Time: \_\_\_\_\_\_\_\_\_ |
| 23 | DSU ends data recording | |  |  | Time: \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 24 | DSU informs TSO Test Engineer that the Aggregate DSU MW Capacity test is complete | |  |  | Time: \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 25 | Date by which DSU provides test data, signed and scanned procedure | |  |  | Date: \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 26 | Date by which DSU provides test report.  (max. 10 business day after the test is completed.) | |  |  | Date: \_\_\_\_\_\_\_\_\_\_\_\_\_ |

# Comments & Sign-Off

|  |
| --- |
| **Comments:** |
| DSU Witness signoff that this test has been carried out according to the test procedure, above.  Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date / Time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| EirGrid Witness signoff that this test has been carried out according to the test procedure, above.  Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date / Time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

1. <http://www.eirgridgroup.com/__uuid/b1d14629-fe49-41a9-ac30-c3cb14393c82/index.xml?__toolbar=1> [↑](#footnote-ref-1)
2. See Grid Code DSU profile diagram in Section 5 for time references. [↑](#footnote-ref-2)