Business Process

BP_SO_12.1 Unit Testing

EirGrid and SONI support the provision of information to the marketplace by publishing operational data, processes, methodologies and reports. This information is key to a well-functioning market and as a transparency measure, assisting understanding of our decision making processes. It is recognised that the detailed elements of our operational processes need to remain agile in the context of service priorities and technical considerations of the new market. Consequently, as operational documents these are subject to change. EirGrid and SONI therefore make no warranties or representations of any kind with respect of this document, including, without limitation, its quality, accuracy and completeness, neither do EirGrid or SONI accept liability for any loss or damage arising from the use of this document or any reliance on the information it contains.

EIRGRID SONI

Table of Contents

1 ASSUMPTIONS

Assumptions made during the design of this process include:

- This is an all-island business process, meaning the same process will be used across both jurisdictions on the island, Ireland and Northern Ireland. It can be conducted by the relevant team in either Dublin or Belfast;
- The following business processes addresses all requirements, including roles, tools, and activities that will enable the Transmission System Operator (TSO) to achieve scheduling objectives; and
- All required systems, including MMS and EDIL are in place. They offer all required functionalities to support business needs.

2 PROCESS REFERENCES

2.1 RELATED RULES REFERENCES

The following table provides references to the documents that govern the design of this business process.

Document Title	Relevant Section	Description
SONI Grid Code	• OC10 System Tests • OC11 Testing, Monitoring and Investigation • SDC2 Scheduling and Dispatch Code No. 2	OC10 System Tests outlines the requirements for Users to carry out System Tests including the timelines for submission of test proposals. OC11 Testing, Monitoring and Investigation deals with testing that may be required under the relevant codes and agreements not covered by OC10. SDC2 is under common governance with the EirGrid Grid Code and details the procedure for the TSO to issue Dispatch Instructions including for test purposes.
EirGrid Grid Code	• OC8 Operational Testing • OC10 Monitoring, Testing and Investigation • SDC2 Scheduling and Dispatch Code No. 2	OC8 Operational Testing outlines the requirements for Users to carry out Operational Tests including the timelines for submission of test proposals. OC10 Monitoring, Testing and Investigation deals with testing that may be required under the relevant codes and agreements not covered by OC8. SDC2 is under common governance with the SONI Grid Code and details the procedure for the TSO to issue Dispatch Instructions including for test purposes.
Trading and Settlement Code	Chapter D Balancing Market Data Submission	Chapter D covers the submission of Physical Notifications including for Generator Units Under Test.
I-SEM Markets Decision Paper SEMC-15-065	10.6 Units Under Test	Decision to allow submission of Physical Notifications to reflect test profile and associated commercial data.
Decision letter for Mod_02_22 to the T&SC	6.1.2 High Level Process Overview	Alternative approach to MOD_02_22 by allowing units returning from an outage and are testing to submit 0 MW Physical Notifications (PNs) in case they could not recover their cost if instructed by the TSO to return from test earlier than expected (where possible) due to an identified risk to security of supply

2.2 RELATED DOCUMENTS

The following table provides a list of documents that are related to this business process.

Document Title	Relationship	Description
Selection Guideline for SEM Testing Tariffs	Guidance Document 01 Feb 2016	Details the process for application of Testing Tariffs to different types of testing and different Units Under Test.
MMS User Guide for System Operations	System Guide	Includes detailed procedures on how to implement process steps in MMS.
Yearly Calculation and Publication of Testing Tariffs	Information	Business process that manages the yearly review, consultation, and publication of testing tariffs applicable to all units testing in the market.
DS3 System Services Compliance and Testing Capability Management Guidance Document	Guidance Document 6 July 2020	Details the compliance testing process DS3 System Services prequalification and contract application.

3 PROCESS CONTEXT

3.1 BUSINESS MODEL RELATIONSHIP

The Unit Testing process sits within the 'Testing' group of the System Operator processes. There is an on-going requirement for the User to carry out testing on their plant and for the TSO to carry out tests for system reasons. The Testing process group covers the processes for managing this testing by System Operations Back Office, Control Centre and System Support & Analysis and also the application of the testing tariff.

3.2 BACKGROUND AND SCOPE

A unit can request to go under test for part of or a full trading day. Testing can be classified as either a Significant Test or Minor Test based on the impact on the power system and market. All testing is subject to the review and approval of the TSO.

3.2.1 TYPES OF TESTING

The type of test being requested by a unit will determine the notification time required by the TSO to assess and approve a test and incorporate it into the scheduling process. Testing can be split in to two categories: a Significant Test and a Minor Test as defined in EirGrid and SONI Grid Codes below.

Significant Test[1]	An Operational Test with a total duration of equal to or greater than 6 hours, or where the Active Energy produced during the total duration of the test is equal to or greater than: (i) 3 times the Active Energy which would be produced by the Test Proposer's Plant during 1 hour of operation at the Plant's Registered Capacity; or (ii) 500 MWh.

Significant testing including commissioning, testing following refurbishment, Grid Code testing, modifications to control systems or other tests that pose an additional risk of trip should be pre-approved by the TSO **at least five business days in advance** of the test proposal date. The TSO may accept a new significant test proposal after this time at their discretion but no later than **09:00 two business days** ahead of proposed test date.

For pre-approved Significant Tests, a PN with corresponding unit under test flags should be submitted by the User via the market participant interface no later than **11:30 on D-1** to facilitate review and approval by the TSO in the Market Management System (MMS) by **13:00 on D-1** in advance of day-ahead market PN submission deadline. Subsequent changes in the intra-day may be facilitated by the TSO. Any requests for modifications or cancellations to a previously approved test PN must be submitted **at least four hours** in advance of gate closure for the relevant imbalance settlement period that is affected and will be subject to review and approval.

Minor Test[2]	An Operational Test with a total duration of less than 6 hours in any Trading Day and were the active energy produced during the total duration of the test is less than: (i) 3 times the Active Energy which would be produced by the Test Proposer's Plant during 1 hour of operation at the Plant's Registered Capacity; and (ii) 500 MWh.

Minor testing which is of short duration and carries no increased risk of trip, e.g. performance monitoring, can be submitted with at least 2 business days in advance via the same process (submission of PNs with associated test flag) in time to allow approval of same before balancing market gate closure. These tests are also subject to the approval of the TSO.

[1] With respect to testing tariffs, it is expected that a high impact test will always be a Significant Test
[2] With respect to testing tariffs, it is expected that a low impact test will always be a Minor Test

Any PNs with associated test flags outside of the agreed timelines may be rejected by the TSO.

3.2.2 TSO INITIATED TESTS

In accordance with the Grid Codes the TSO may require tests on an individual unit or a number of units. In this circumstance the TSO will enter the required test profile into the MMS via the user override management function for inclusion in scheduling runs. The TSO will notify the Participant of the requirement for testing and dispatch the unit as required for the duration of the test.

3.2.3 TESTING TARIFFS

The role of Testing Tariffs is to provide a mechanism for the recovery of costs associated with testing and are reviewed annually by System Support & Analysis. These are approved by the Regulatory Authorities (RAs) and notified to I-SEM for settlement purposes. When approving a test request the TSO must determine if the testing tariff is to be applied and notify the Participant of same.

3.2.4 DISPATCH INSTRUCTION TEST FLAGS IN EDIL

For the purpose of testing, test flags are applied to dispatch instructions in EDIL in the instance where the unit under test cannot follow its approved Unit Under Test Physical Notification, and is requesting a deviation from the agreed profile. As units under test submit Commercial Offer Data (COD), if there is a deviation from the agreed profile, in the absence of test flags being applied to dispatch instructions in EDIL, the TSO would incur *inc* and *dec* costs associated with the change of profile.

The dispatch instruction test flag may also be used in certain instances where there is insufficient notice to submit a Unit Under Test Physical Notification, e.g. to test sync a generator following a fail sync. The part of the instruction covered by this flag is not deemed as a dispatch instruction for settlement purposes.

3.2.5 SCOPE

This process covers the requirements for Units to notify the TSO of requirements for testing and the subsequent approval process by the TSO including selection of the testing tariff. It is applicable to all units capable of submitting Physical Notifications. As per the Trading and Settlement Code, the TSO shall not grant under test status to the following: Units which have priority dispatch and which are not dispatchable; generator units which are not dispatchable and not controllable; Interconnector Residual Capacity Units; or Interconnector Error Units. A separate Interconnector Under Test business process details the steps involved in testing of interconnectors.

4 PROCESS OBJECTIVE

The objective of this Business Process is to meet relevant obligations under the Codes, including:

1. EirGrid Grid Code OC8 Operational Testing
2. EirGrid Grid Code OC10 Monitoring, Testing and Investigation
3. EirGrid and SONI Grid Code SDC2 Scheduling and Dispatch Code No. 2
4. SONI Grid Code OC10 System Tests
5. SONI Grid Code OC11 Testing, Monitoring and Investigation
6. Trading and Settlement Code, Chapter D Balancing Market Data Submission
7. Selection Guidelines for SEM Testing Tariffs

5 ROLES AND RESPONSIBILITIES

5.1.1 MARKET PARTICIPANTS

Team Name	Responsibility in relation to process	Timeline Associated
Market Participant	• Submit all Physical Notifications and associated unit under test flags in accordance with agreed timelines	As required

5.1.2 EIRGRID/SONI

Team Name	Responsibility in relation to process	Timeline Associated
System Operations Back Office (Process Owner)	• Review and pre-approval (including determining if the testing tariff is to be applied) for all test proposals as per agreed timelines.	Before 11:00 D-1
System Support & Analysis	• If required, discuss and agree test proposal with System Operations Back Office Unit including determining if the testing tariff is to be applied.	Before 11:00 D-1
Control Centre	• Review and approval (including application of testing tariff) for all Market Participant submitted Unit Under Test Physical Notifications including any subsequent modifications and/or cancellations received within agreed timelines including approval of new minor test requests received after this time.	After 11:00 D-1

6 PROCESS DESCRIPTION

6.1 LEVEL 3 PROCESS

6.1.1 HIGH LEVEL PROCESS OVERVIEW

All unit types capable of submitting PNs will be required to follow this process. Once a unit has identified a need to carry out a test, pre-approval for the proposed test is required from the TSO. Once the test has been pre-approved, participants submit a PN via the market participant interface specifying the period that the unit is requested to be under test with corresponding test flags. Any PN submission that includes a PN with a test flag will require final approval by the TSO before it is accepted in the MMS and subsequent scheduling runs in the Security Constrained Unit Commitment (SCUC) and Security Constrained Economic Dispatch (SCED) tools. Any subsequent modifications to a test PN, including cancellation, is also subject to TSO approval.

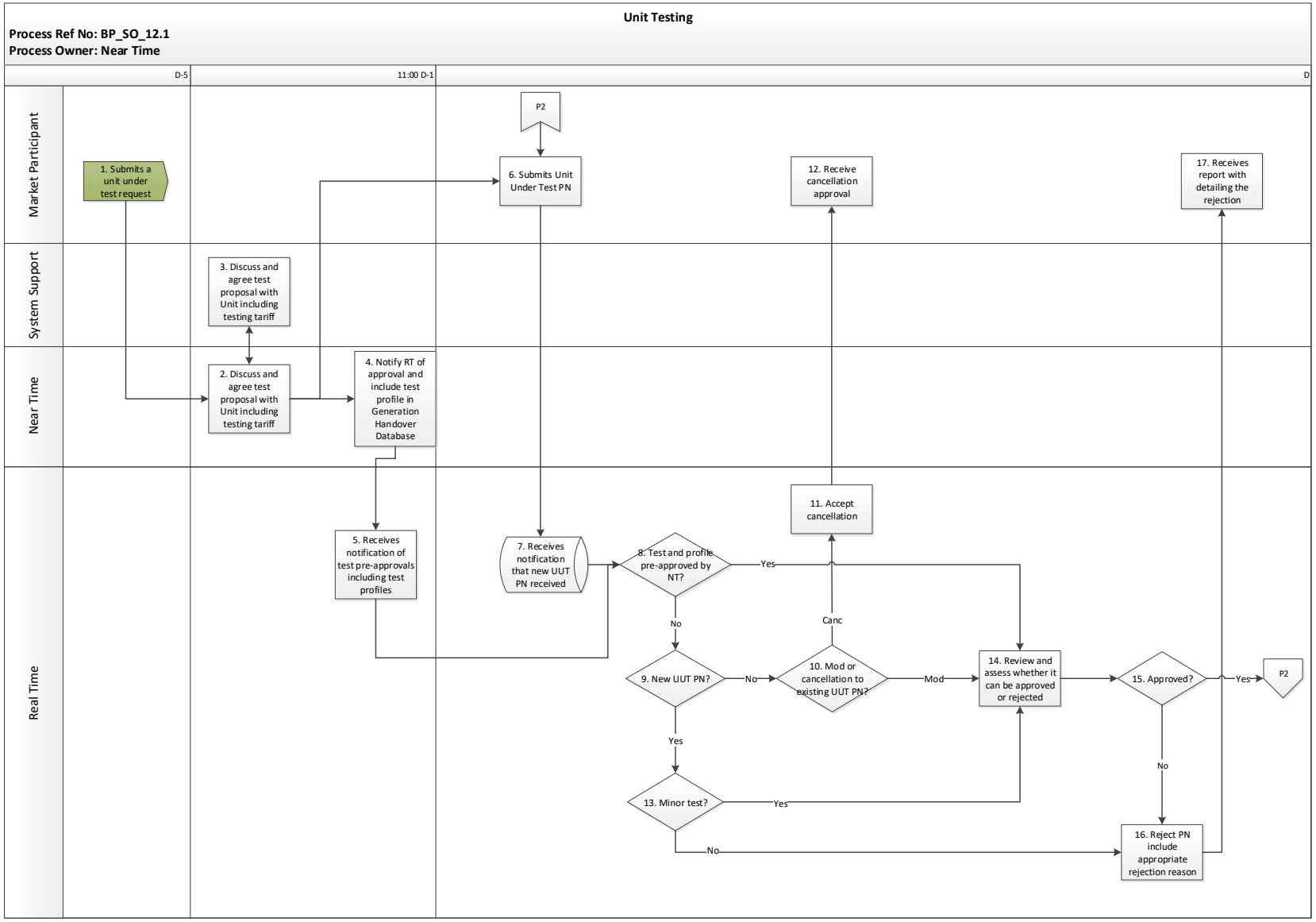
Once a PN submission with a test flag has been approved, the unit is considered 'under test' for all imbalance settlement periods that contains a test flag, and testing tariffs, if relevant, will be applied on the metered output of that unit for the full thirty minute period. The unit under test physical notification (UUT PN) is fixed for all scheduling runs, meaning that SCUC/SCED will not deviate from the test schedule even if such deviations would appear economic. The unit will receive dispatch instructions to follow its test schedule in the normal manner for the duration of the testing. The TSOs will only dispatch a unit away from its test schedule for reasons of system security. If the unit is not capable of following its Dispatch Instructions for any reason and requests a change in output then this should be managed using Dispatch Instruction Test Flags in EDIL. This is to ensure that the unit is treated correctly in settlement, i.e. uninstructed imbalances.

6.1.2 EARLY RETURN FROM OUTAGE WHILE TESTING

For units that are in the process of returning from an outage, are fully registered market participants and are considered units under test:

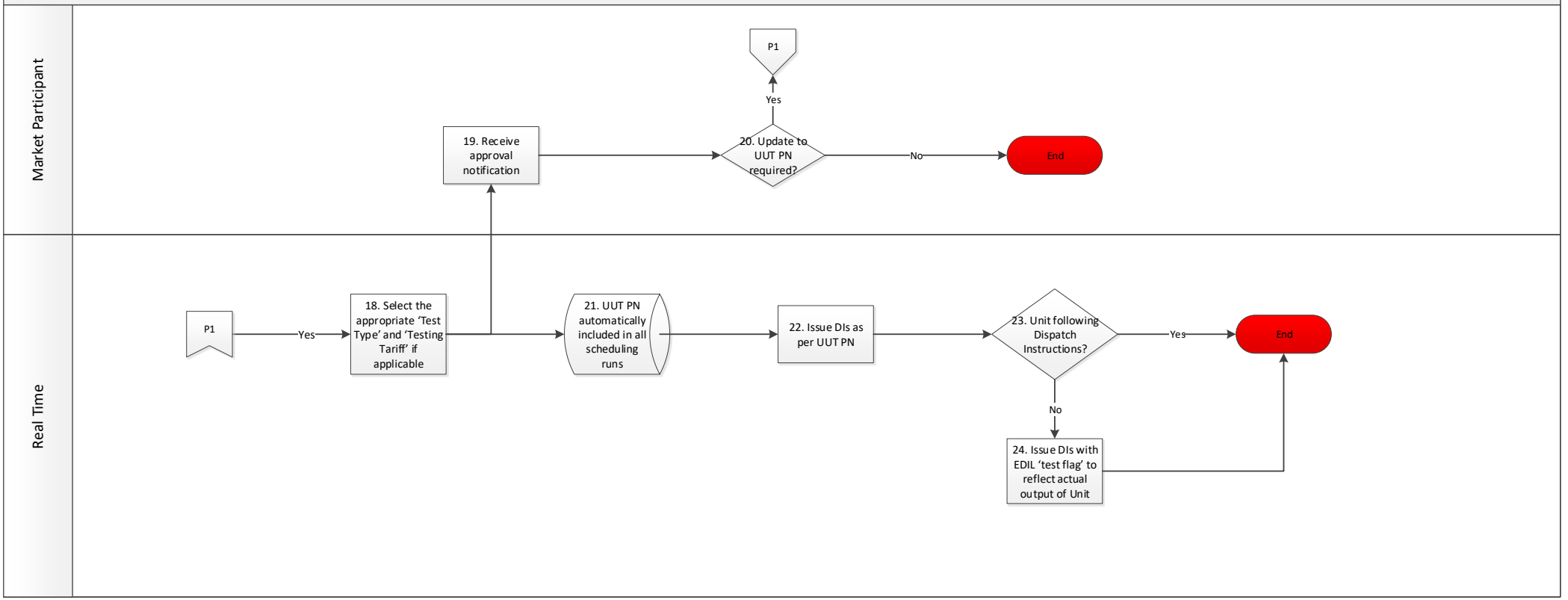
Should there be a Security of Supply (SoS) risk, the TSO may request units, if capable of doing so, to return to service earlier than their latest official notification. A SoS risk will be determined solely by the TSO with consideration of the associated risks and costs of such. The revised return to service time will be agreed between the generator and the TSO. Subject to prior communication and agreement via email between the generator and the TSO, if the generator may fail to recover operating costs, the generator may submit test PNs of 0 MW to allow for cost recovery. This will be dependent on the anticipated system conditions at the revised return time.

6.1.3 PROCESS MAP



Unit Testing

Process Ref No: BP_SO_12.1
Process Owner: Near Time



6.1.4 PROCESS STEPS

#	Step	Step Description	Responsible Role	Outputs	Indicative Timing/ Frequency	System
1	Submits unit under test request	Participant sends email to neartime@eirgrid.com or neartime@soni.ltd.uk, as appropriate including details of test and associated profile, and copies email to balancingmarketoperations@eirgrid.com.	Market Participant	Test request	At least five business days before test start. **Note: Near Time may accept test requests for significant tests after this time at their discretion**.	E-mail
2	Discuss and agree test proposal with Unit including if the testing tariff is to be applied	Near Time and, if required, System Support reviews the test request and profile in line with assessment criteria in Section 6.1.4 and notifies Market Participant that the test profile has been pre-approved and if the testing tariff will be applied.	Near Time User	Pre-approval notification	At least two business days before test start.	E-mail
3	Discuss and agree test proposal with Unit including if the testing tariff is to be applied, if required.	Near Time and, if required, System Support reviews the test request and profile in line with assessment criteria in Section 6.1.4 and notifies Market Participant that the test profile has been pre-approved and if the testing tariff will be applied.	System Support User (Generator Testing)	Pre-approval notification	At least two business days before test start.	E-mail
4	Notify Real Time of test pre-approval	Once test proposal has been agreed with the Unit, Real Time should be notified via Handover Database.	Near Time User	Notification	At least two business days before test start.	Handover Database

#	Step	Step Description	Responsible Role	Outputs	Indicative Timing/ Frequency	System
5	Receives notification of test pre-approvals including test profiles	Real Time receives notification from Near Time that a test has been pre-approved including test profile and if the testing tariff is to be applied.	Real Time User	N/A	As soon as test is pre-approved by Near Time	N/A
6	Submits unit under test PN	Participant submits a PN as per pre-approved test profile including test flags for the relevant times when the unit is under test.	Market Participant	UUT PN submission	No later than 11:30 D-1 for Significant Test	Market Participant Interface
7	Receives notification that new UUT PN received	Participant notifies Real Time via phone call that a new UUT PN request has been sent to the MMS	Market Participant	Phone call	Immediately following Step 6	N/A
8	Test and profile pre-approved by Near Time?	Has the test profile received pre-approval from Near Time? If yes, proceed to Step 13. If no, proceed to Step 9.	Real Time User	Decision	As required	N/A
9	New UUT PN?	Is the UUT PN a new request that has not been pre-approved by Near Time? If it is a new UUT PN, go to Step 13. If it is an existing UUT PN, go to Step 10.	Real Time User	Decision	As required	N/A
10	Modification or cancellation to existing UUT PN?	Real Time User determines whether it is a cancellation request or modification to an existing UUT PN? If it is a cancellation, go to Step 11. If it is a modification, go to Step 14.	Real Time User	Decision	As required	N/A

#	Step	Step Description	Responsible Role	Outputs	Indicative Timing/ Frequency	System
11	Accept cancellation	Real Time User accepts the cancellation of the UUT PN.	Real Time User	System notification	As required	MMS
12	Receive cancellation approval	Market Participant receives an automated notification that the cancellation has been approved.	Market Participant	N/A	As required	Market Participant Interface
13	Minor test?	Real Time to assess if the new UUT PN meets the criteria for a minor test? If yes, go to Step 14. If no, go to Step 16.	Real Time User	Decision	As required	N/A
14	Review and assess whether it can be approved or rejected	Real Time determines if test can be approved or rejected in line with criteria outlined in Section 6.1.4.	Real Time User	N/A	As required	N/A
15	Approved?	Is the UUT PN approved? If it is approved, go to Step 18. If the request is not approved, go to Step 16.	Real Time User	N/A	No later than 13:00 day ahead.	N/A
16	Reject PN include appropriate reason	Real Time User rejects submission based upon the appropriate reason from the following list: • Profile Infeasible • Insufficient Notice • Reasons of System Security • Other (including text explanation)	N/A	Notification	As required	MMS

#	Step	Step Description	Responsible Role	Outputs	Indicative Timing/ Frequency	System
17	Receives report with detailing the rejection	Market Participant receives a report detailing the rejection.	N/A	N/A	As required	Market Participant Interface
18	Select the appropriate 'Test Type' and 'Testing Tariff'	User selects the appropriate 'Test Type' from the following options: • Participant Test • TSO Test • Other User also selects the 'Testing Tariff' if applicable as per pre-approval notification from Near Time.	Real Time User	Approval	As required	MMS
19	Receive approval notification	Market participant receives notification that testing has been approved and if the Testing Tariff will be applied for settlement.	N/A – System Step	System notification	As required	Market Participant Interface
20	Update to UUT PN required?	If an update is required to the UUT PN then the Market Participant should contact Real Time to discuss the update in advance of submission via the MPI. If yes, go to Step 2. If no, process ends.	Market Participant	Test request	As required up until 2 hours before gate closure for the affected trading period.	Market Participant Interface / MMS
21	UUT PN automatically included in all scheduling runs	Once a UUT PN has been approved in MMS it is included in all subsequent scheduling runs.	N/A – System Step	Indicative schedules	As required	MMS

#	Step	Step Description	Responsible Role	Outputs	Indicative Timing/ Frequency	System
22	Issue DIs as per UUT PN	Real Time User issues dispatch instructions as per UUT.	Real Time User	Dispatch Instructions	As required	MMS / EDIL
23	Unit following Dispatch Instructions?	If an update is required to the UUT PN then the Market Participant must contact Near Time to discuss the proposal as per Step 2.	Market Participant	Test request	As required up until 11:30 D-1	Market Participant Interface
24	Issue DIs with EDIL 'test flag' to reflect actual output of Unit	Real Time User should issue any dispatch instructions that differ from the UUT PN using a 'test flag' on the instruction so that it is liable for any imbalance.	Real Time User	Dispatch Instructions	As required	EDIL

6.1.3A PROCESS STEPS IN CASE OF AN IDENTIFIED SECURITY OF SUPPLY ISSUE

#	Step	Step Description	Responsible Role	Outputs	Indicative Timing/ Frequency	System
1	Contact Unit Under Test in case of a Security of Supply issue	The TSO identifies a potential Security of Supply issue and contacts (by e-mail) the Unit Under Test to enquire about its availability for a return from outage earlier than expected	TSO (Real time, Near Time or System Support teams)	New Sync and MWOF Dispatch Imstruction	As early as possible and pending agreement between the TSO and the Unit Under Test.	E-mail
2	Update to UUT PN required?	If as a result of STEP 1, the Market Participant estimates an under-recovery of costs, the UUT should consider contacting Real Time to plan an update the submitted PNs. The resubmission of PNs via MPI is	Market Participant	PNs submission with Under test request	As required before gate closure for the affected trading period.	Market Participant Interface / MMS

#	Step	Step Description	Responsible Role	Outputs	Indicative Timing/ Frequency	System
		at the discretion of the Participant but the TSO in this case can allow null or zero PNs to allow full recovery. If no update to PNs is required go to STEP 4				
3	Approve updated UUU PNs	After agreement with Marlet Participant approval given to UUT PNs	TSO real Time team	UUT flag	As required before gate closure for the affected trading period.	MMS
4	UUT PN automatically included in all scheduling runs	UUT PNs approved in MMS, are included in all subsequent scheduling runs.	N/A – System Step	Indicative schedules	As required	MMS

6.1.5 CRITERIA FOR APPROVAL OF TESTS

Overall review of Unit Testing:

1. While more than one unit may be allowed to undergo test at the same time, the combined output of units testing should not exceed 500 MW on the Island due to the risk of multiple generator trippings. Only one large unit (>250 MW) should be permitted to test in a given trading day unless a reasonable gap is placed between tests.
2. No more than two conventional units (including interconnectors) will be permitted to test in a given day.
3. The exception to the above points is a unit undergoing a minor performance related test where there is no additional risk of trip.
4. If more than one unit has requested to test on the same day then the profiles will have to be coordinated so the 500 MW rule is not breached in any trading period. If this is not possible then the unit which had its profiles sent in and approved first takes priority.
5. In accordance with EirGrid Grid Code OC8.9.3 or SONI Grid Code OC11.8, as appropriate, Near Time will prioritise test requests where the test proposer has notified the TSO that testing is required in accordance with licence conditions, statutory regulations or safety codes or a delay in the execution of the tests may have an adverse material impact on a User, though tests may be prioritised according to other concerns within the reasonable judgment of the TSO.
6. Near Time can also prioritise one test request over another should system conditions necessitate, e.g. testing of a generator required following resolution of performance issues.

Review of Unit Under Test Physical Notifications:

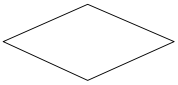
7. The test profile (MW and Mvar) should attempt to follow the demand profile, unless specifically required for Grid Code Testing (e.g. max leading/lagging Mvar tests) or system conditions require.
8. Ramping against the load cannot be facilitated i.e. during peak periods of demand rise.
9. No base load testing overnight or at times of low demand such as weekends (low load testing may be facilitated) for large units (>300 MW).
10. The ability of the unit to provide frequency response whilst under test.
11. The risk of trip associated with the test.
12. Consider the impact on Transmission Constraint Groups (TCGs) in SCUC/SCED, e.g. should the unit be included / excluded from ROI_Min? Is there sufficient fast acting reserve if a GT is under test? etc.
13. The margin should be checked if a large set is testing.
14. Consider any impacts on Near Time Constraint Studies and reassess studies if necessary.
15. Special consideration should be given to more onerous tests such as load rejection, frequency or PSS tests.
16. Ensure any requests for weekend testing are appropriate for a weekend demand scenario, i.e. slower and later morning load rise and reduced night valley demand.

The following should also be considered by Real Time when carrying out SCUC/SCED runs:

17. Inertia/ROCOF limits should not be breached for testing at any time.
18. Additional units may be required to increase system inertia.
19. Ability to secure adequate reserve, especially POR and FFR.
20. If testing requires additional reserve to be carried during Phase 1 or Phase 2 testing then additional units may be committed by SCUC/SCED to cover the increased reserve requirement
21. Dispatching down of priority dispatch is permitted, where appropriate, but should be avoided to facilitate non-critical testing of conventional plant.
22. Minor testing should not cause prohibitive start-up costs to be incurred, i.e. an additional unit should not be started to provide reserve or balance Mvars etc.
23. Displacement of in-merit plant to replace MWs (constraining up expensive generation & constraining down in-merit plant) should be evaluated for minor tests.

7 APPENDICES

7.1 PROCESS FLOWCHART KEY

FLOWCHART KEY	
	Trigger
	Process step
	Process decision / question
	Reference to another process
	Another business process to be implemented following current step (current step is a trigger for another process)
	Process end
	System (automatic step)