

I-SEM Testing Tariff

High Level Options Consultation

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EXECUTIVE SUMMARY

Testing Tariffs are currently applied to Units Under Test (UUT) in the Single Electricity Market (SEM) on the basis of the MW capacity¹ of the generator unit. The tariffs are dependent upon the type of test being carried out and the impact to system security. There are a number of costs that the Transmission System Operators (TSOs) consider are appropriate for inclusion in the testing tariffs. These costs relate to the additional operational reserve carried to maintain system security when a unit is testing, the effect a UUT has on unit commitment decisions, and the costs incurred when a UUT output drops very quickly.

In light of the new Integrated Single Electricity Market (I-SEM), which is due to go live in Ireland and Northern Ireland on 23rd May 2018, the TSOs consider that it is now appropriate to review the current testing tariff mechanism and rates to ensure that these are applicable for the new market design. This paper proposes two types of testing tariffs, the criteria for when these tariffs should apply and finally the paper presents a number of options how the system costs could be recovered from the UUT.

The TSOs welcome comments from Industry on these proposals. Based on comments received the TSOs will prepare a second consultation paper outlining comments received from Industry and taking account of these comments the TSOs will identify a recommendation.

¹ Also referred to as the Registered Capacity or Maximum Generation Capacity

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1. INTRODUCTION

Testing tariffs are applied to all generator units that may be granted under test status in SEM. Paragraph 5.175 of the Single Electricity Market (SEM) Trading and Settlement Code requires the System Operators to make a report to the Regulatory Authorities (RAs) at least 4 months before the start of the Year² proposing values for the testing tariffs year. This requirement is still in place in the draft Part B of the I-SEM Trading and Settlement Code.

The SEM Testing Tariffs Decision Paper³ outlines the existing tariff structure and methodology for calculating the testing tariff rates. In light of the new I-SEM design the TSOs consider that it is appropriate to review the current structure and methodology to ensure it is still fit for purpose for the new market.

Section 3 of this paper outlines the existing testing tariff structure in SEM. The current types of testing that UUT can undertake, the TSOs selection process for determining the tariff that should be applied and the cost components which are included in each of the testing tariffs is outlined in detail. The current process and timelines for units applying for under test status in the SEM is not detailed in this paper as this not part of the testing tariffs structure and is covered by a separate process.

Section 4 gives a high level overview of the background of I-SEM, on how scheduling and dispatch and the balancing market will operate in the new market and finally how different types of units can now go under test and how this differs from the current approach. The process of being granted under test status in I-SEM and the timelines associated with this are outside the scope of this paper.

There are two types of UUT that are proposed in this paper and Section 5 covers these in detail. These are high impact and low impact tests. The paper outlines the proposed methodology of how the TSOs will determine what type of category that the UUT should fall into. The cost components associated with the two tariffs and options on how these could be recovered is presented for feedback.

² “Year” defined as per Trading and Settlement Code glossary: “means a period commencing at 00:00h on 1 January and ending at 24:00h on the next occurring 31 December.

³ [SEM-12-014] <https://www.semcommittee.com/news-centre/sem-testing-tariffs-decision>

2. REQUESTS FOR COMMENTS

Comments are invited from interested parties on Section 5 of this consultation paper and should be aligned with the sub-sections of this section. Comments should be submitted by email to tariffs@eirgrid.com and tariffs@soni.ltd.uk. If confidentiality is required, this should be made explicit in the response as the comments will be published on our websites⁴. Please note that, in any event, all responses will be provided to the RAs.

The closing date for responses is 5pm on Friday 30th June 2017.

The steps following the closing date are as follows:

- The TSOs will consider the comments received on this consultation paper and publish a second consultation paper in December 2017 outlining the preferred option and proposed tariffs for this option;
- The TSOs will consider the comments received on the second consultation paper and publish a recommendations paper outlining the TSOs preferred solution and the tariff rates;
- The RAs will approve/reject the recommendations proposed in light of the responses received; and
- The TSOs will implement any changes and tariffs in accordance with the RAs decision paper.

⁴ www.eirgridgroup.com and www.soni.ltd.uk

3. SEM: OVERVIEW OF CURRENT ARRANGEMENTS FOR GENERATING UNIT TESTING

3.1. Background

There are currently two main types of testing for generating units as outlined in the Grid Codes:

1. Within Day Test; and
2. Full Day Test (Market Testing).

Testing tariffs are applied based on the Registered Capacity of a unit due to how the SEM systems are configured. The charge based on the Registered Capacity is then applied against the actual metered MW output of the generating unit as a €/MWh charge.

The current market systems do not allow Pumped Storage Units, Demand Side Units, Interconnector Units, Interconnector Residual Capacity Units or Autonomous Generator Units except for Interconnector Error Units to go under test.

The TSOs have a SEM Trading and Settlement Code obligation to make a report to the Regulatory Authorities (RAs) at least 4 months before the start of the calendar year proposing values for the testing tariffs based on the agreed methodology outlined in SEM-12-014.

3.1.1. Within Day Test

A Within Day Test is defined as a test with a total duration of less than 6 hours in any trading day and if the scheduling of the test results in a deviation from the generation schedule of less than:

- (i) Three 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

This testing is typically to facilitate minor testing required by a participant of a generating unit in which there is:

- (i) No risk of the unit failing to meet their required dispatch per the generation schedule;
- (ii) No risk of the unit tripping; and
- (iii) Where the unit does not become the Largest Single Infeed (LSI) and therefore drive a larger reserve requirement on the system.

This testing should not increase system costs. The UUT are dispatched to the load profile, as agreed with the TSOs, using test flags in the dispatch software. This means that the Single Electricity Market (SEM) sees this dispatch as an Uninstructed Imbalance. This Uninstructed Imbalance charge levied to the generating unit which is designed to cover the increased cost of this testing.

3.1.2. Full Day Test

Since the introduction of the Single Electricity Market (SEM) in November 2007 testing tariffs have been applied to units who have nominated under test status. The under test status applies for the full trading day in the market. When a unit is under test in the SEM this has a number of advantages for the UUT. These include the flexibility to nominate its output and conduct unit tests while being exempt from certain charges that would otherwise apply if under normal operation. Sections 5.168 to 5.184 of the Trading and Settlement Code sets out in more detail a number of the criteria for generating units under test.

When SEM was implemented in 2007 the previous testing tariff rates were carried forward for a number of years. In July and August 2011 the TSOs carried out a consultation with industry which explained the methodology of the testing tariffs and proposed a new schedule of testing tariffs. The consultation

paper outlined a number of costs that the TSOs considered are appropriate for inclusion in the relevant testing tariffs. These tariffs were designed to cover some of the system costs associated with UUT. These costs relate to the additional operational reserve carried to maintain system security when a unit is testing, the effect a UUT has on unit commitment decisions, and the costs incurred when a units output drops very quickly. This paper outlined two types of tariffs depending on the impact associated with the testing and these were Tariff A (high impact) and Tariff B (low impact). The testing tariffs followed the following principles:

1. **Efficient Testing** - testing should be carried out in an efficient and prompt manner;
2. **Cost Reflectivity** – where charges are imposed they should be proportionate and cost reflective. Due consideration was given to making the proposed testing tariffs as cost reflective as possible;
3. **Positive Incentives** – the two different testing tariffs provided a clear financial incentive to units under test to progress through testing promptly.

Based on comments received to the consultation paper the TSOs published the SEM Testing Tariff Recommendations⁵ paper in November 2011. The new methodology was approved by the SEM Committee in March 2012⁶.

⁵ SEM Testing Tariff Recommendations Paper November 2011

<https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-12-014b%20Testing%20Tariff%20Recommendations%20Paper.pdf>

⁶ [SEM-12-014] <https://www.semcommittee.com/news-centre/sem-testing-tariffs-decision>

3.2. Existing Testing Tariff Structure

3.2.1. Overview of Current Tariffs

The current Testing Tariff structure was introduced in March 2012⁷ and includes two tariffs depending on the risk associated with the testing.

An overview of the cost components associated with the 2017 tariffs are outlined in Table 1 and further detail of these components are given in Sections 3.2.1.1 and 3.2.1.2. As per the SEM-12-014 the TSOs must review the tariffs annually based on an agreed methodology.

Generator MW Capacity	TARIFF A					TARIFF B
	Reserve System Services Cost	Reserve Imperfection Cost	Unit Commitment	Tripping	Total Charge	Tripping
GEN <50			€ 6.09		€ 6.09	
50 < GEN ≤100			€ 4.74		€ 4.74	
100 < GEN ≤ 150			€ 5.17		€ 5.17	
150 < GEN ≤ 200			€ 5.22	€ 0.36	€ 5.58	€ 0.22
200 < GEN ≤ 250			€ 5.41	€ 0.58	€ 5.99	€ 0.36
250 < GEN ≤ 300			€ 5.39	€ 0.94	€ 6.33	€ 0.58
300 < GEN ≤ 350			€ 4.71	€ 1.53	€ 6.24	€ 0.95
350 < GEN ≤ 400	€ 0.05	€ 0.11	€ 3.35	€ 2.48	€ 5.99	€ 1.54
400 < GEN ≤ 450	€ 0.24	€ 0.73	€ 1.92	€ 4.03	€ 6.92	€ 2.51
450 < GEN	€ 0.46	€ 1.59	€ 0.72	€ 6.57	€ 9.34	€ 4.08

Table 1: Overview of Cost Components of 2017 Testing Tariffs

3.2.1.1. Tariff A

A UUT will be assigned to Tariff A for the following reasons:

- Unit Commitment:** The UUT nominates into the SEM the load profile which they would like to follow, however, if it is likely due to unproven running that there may/will be difficulties meeting commitment and/or nominated dispatch schedule then the UUT may be considered unreliable and will not be included as part of the TSO day ahead unit commitment schedules. Additional unit(s) may therefore be constrained up/on to meet system demand for that day. This leads to an additional system cost;
- Tripping:** The UUT is considered to be at a higher risk of tripping than that when under normal operation. If the UUT trips the TSO must react to maintain system security in a short space of time. It should be noted that Trip Charges through the Other System Charges Methodology⁸ are currently not applied to a UUT in SEM. The TSOs therefore includes a provision for a probability of the UUT tripping based on actual statistics of trips for other UUT when they were being levied Testing Tariff A. The current trip threshold of only applying a trip charge to units over 100 MW however does apply;
- Reserve:** To cover the uncertainty associated with the unit reliability the TSOs will schedule to ensure that there is 100% Primary Operating Reserve and Secondary Operating Reserve for the UUT. This may require additional unit(s) to be committed to provide this additional reserve if the UUT drives the system reserve requirement as the Largest Single Infeed. The current operational policy is to have sufficient Primary Operating Reserve to cover 75% of

⁷ [SEM-12-014] <https://www.semcommittee.com/news-centre/sem-testing-tariffs-decision>

⁸ Further information on trip charges and SND charges can be found in the Other System Charges Methodology Statement; available at www.eirgridgroup.com & www.soni.ltd.uk

the LSI. For example the average LSI in 2016 was 402 MW, therefore the average Primary Operating Reserve requirement would have been 302 MW. If a UUT is going to export greater than 302 MW then they would drive the reserve requirements and are levied this additional cost. Furthermore there is an additional System Services charge associated with payment for the additional Primary and Secondary Operating Reserve.

If a UUT deviates away from the market nominations then Short Notice Declaration (SND)⁴ charges are not levied as it assumed that the tariff covers this deviation. The only scenario when SNDs will be applied is if the UUT trips unexpectedly.

3.2.1.2. Tariff B

A UUT will be assigned to Tariff B for the following reasons:

- a) **Tripping:** The UUT is considered to be at an increased risk of tripping when compared to normal operation, however at a lower risk than if it was being levied Testing Tariff A. If the UUT trips the TSOs must react to maintain system security in a short space of time. It should be noted that Trip Charges through the Other System Charges Methodology are not applied to a UUT under test in SEM. The TSOs therefore includes a provision for the probability of the UUT tripping based on actual statistics of trips for other UUT when they were being levied Testing Tariff B. The current trip threshold of only applying a trip charge to units over 100 MW however does apply. The trip charge component under Tariff B is less than the trip charge component which makes up Testing Tariff A.

If a UUT deviates away from the market nominations then Short Notice Declaration (SND) charges are levied. This is because the TSOs must ensure that the system demand matches the generation, therefore any shortfall in energy at short notice needs to be sourced from more expensive alternatives, therefore leading to increased costs for the end consumer.

3.3. Decision on which Testing Tariff Currently Applies

Due to the increased amount of testing on the system and due to queries from generating units the TSOs published *The Selection Guideline for SEM Testing Tariffs* in 2016⁹. This document outlines which Testing Tariffs are levied to a UUT (new, refurbished and existing) under test in the SEM.

3.3.1. New or Refurbished Generating Units

Any UUT which is new or refurbished¹⁰ is currently automatically levied Testing Tariff A. The transfer from Testing Tariff A to Testing Tariff B is communicated when the UUT meets the success criteria outlined below.

A UUT is allowed to move from Testing Tariff A to Testing Tariff B if it operates reliably for 72 continuous hours with its active power output greater than 90% of its Registered Capacity. Any tripping or reliability issues may result in the continuation of the UUT being levied Testing Tariff A. Further points of note are:

- The TSOs determine, taking into account specific issues relating to the plant under test and the testing conditions that were experienced, when the UUT can move from Testing Tariff A to Testing Tariff B;

⁹ Selection Guideline for SEM Testing Tariffs

http://www.eirgridgroup.com/site-files/library/EirGrid/16.02.01.TT-Selection-Guideline_Ext.pdf

¹⁰ Refurbished means any unit which has undergone any electrical or mechanical changes

- The UUT is required to declare their availability in line with their test profile, unless they become unavailable. If they become unavailable or if they are not testing then they are required to declare zero availability. This is in line with the Other System Charges Methodology Statement¹¹.

3.3.2. Existing Units

If an existing UUT is carrying out testing in the SEM then it will automatically default to Testing Tariff A for the first 72 hours of testing, unless the testing is deemed low impact. Figure 1 gives a guideline for determining whether the generating unit is high or low impact. If a generating unit is deemed to be high impact then it will be levied Testing Tariff A for the first 72 hours of actual testing. Any delays to testing, unreliability issues or not following the load profile (to ± 50 MW or ± 50 Mvar) will result in the UUT continuing on Testing Tariff A until reliable operation can be proven. Even if a UUT is transferred to Testing Tariff B it may be returned to Testing Tariff A if the testing in any day is considered to be high impact. Further points of note are:

- The TSOs will determine when the UUT can move from Testing Tariff A to Testing Tariff B; and
- UUT should declare their availability in line with their test profile, unless they become unavailable. If they become unavailable or if they are not testing then they should declare zero availability.

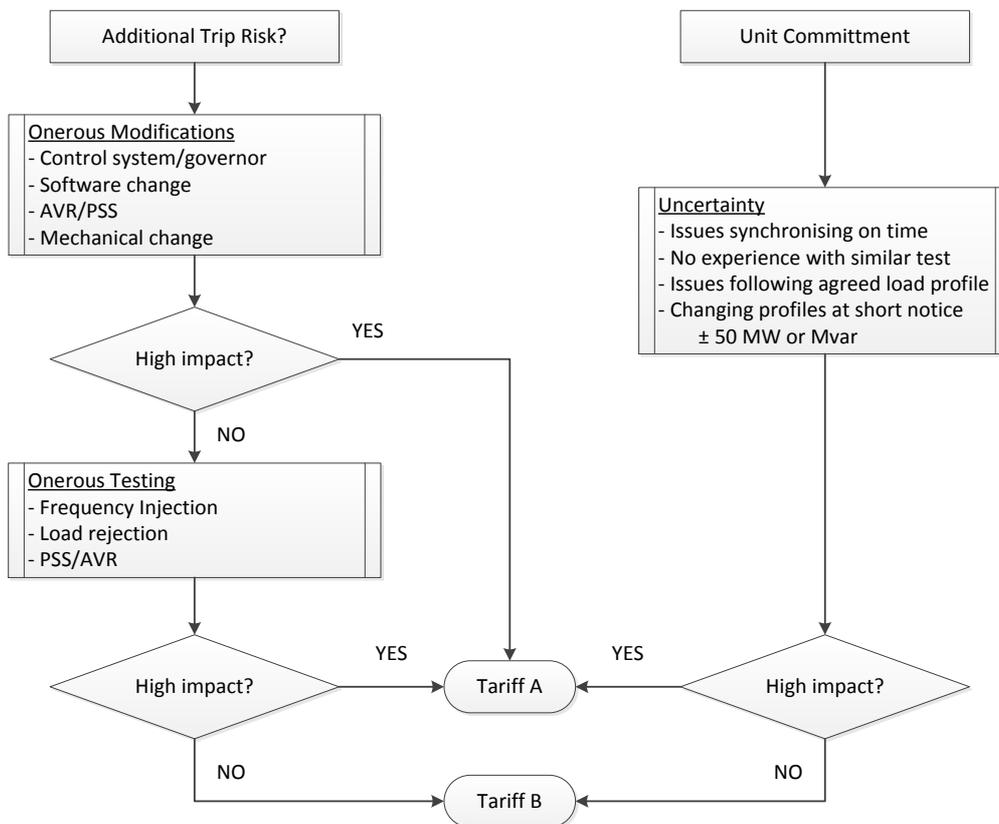


Figure 1: Current Guidance Process for Testing Tariff A or B

¹¹ Other System Charges Methodology Statement; available at www.eirgridgroup.com & www.soni.ltd.uk

4.1. Background of I-SEM

The Integrated Single Electricity Market (I-SEM) is a new wholesale electricity market arrangement for Ireland and Northern Ireland. The new market arrangements are designed to integrate the all-island electricity market with European electricity markets, enabling the free flow of energy across borders. It consists of a number of markets including:

The **Day-Ahead Market (DAM)** is a single pan-European energy trading platform in the ex-ante time frame for scheduling bids and offers and interconnector flows across participating regions of Europe. The DAM involves the implicit allocation of cross-border capacity through a single centralised price coupling algorithm. The algorithm, taking into account the cross-border capacity advised by the TSOs, determines prices and physical positions for all participants in all coupled markets.

The **Intra-Day Market (IDM)** allows participants to adjust their physical positions closer to real time. The need to adjust their positions can arise for a number of reasons, including orders failing to clear in the DAM, new information becoming available (e.g. plant shutdowns and changes to forecasts), congestion on interconnectors driving price differentials between zones, and asset less traders wishing to exit their positions. The long-term model for a single European trading platform is based on continuous cross border trading. However, at go-live, intraday trading is only continuous within the SEM (within-zone), where bids and offers are continuously matched on a first-come-first-served basis. Three cross-border intraday auctions are also run using a version of the DAM algorithm.

The **Balancing Market (BM)** determines the imbalance price for settlement of the TSO's balancing actions and any uninstructed deviations from a participant's notified ex ante position. The BM is different from the other markets in that it reflects actions taken by the TSO to keep the system balanced and secure—for example, any differences between the market schedule and actual system demand, variations in wind forecasting, or following a plant failure. The BM uses a rules based flag-and-tag process to determine the spot price in each 5 minute imbalance pricing period. The highest priced unflagged offer that is dispatched sets the imbalance price in each period. The flag-and-tag process excludes bids and offers that are scheduled due to system constraints. The imbalance price for the 30 minute imbalance settlement period is the average of the six imbalance prices.

Participants are responsible for meeting their ex ante commitments and when they cannot they are financially exposed in the BM. Energy actions in the BM are settled at the imbalance price. Additional payments or charges are incurred for uninstructed deviations from the schedule at the imbalance settlement price. Non-energy actions (e.g. reserves, voltage, congestion on lines, etc.) are settled at either the bid or offer price or the imbalance price, depending on whether the generating unit is constrained up or down.

I-SEM arrangements are due to go live on 23rd May 2018.

4.2. Scheduling & Dispatch and the Balancing Market

Physical Notifications (PNs) are submitted by market participants as their best estimate of their intended level of generation and/or consumption, reflecting their expected ex-ante contracted position. The Balancing Market requires market participants to have submitted PNs with COD representing their incremental and decremental costs to move from this position to the TSOs by DAM gate closure (13:30 day-ahead). This forms the starting position for the scheduling process. Market Participants are permitted to change their PNs and COD after this time and up to Gate Closure of the Imbalance Settlement Period (each thirty minute period beginning on each hour or half hour). The Final Physical Notifications (FPN) are the final committed value that a participant wishes to generate and/or consume.

The TSO may need to deviate from these positions to manage system constraints, provide system services and for energy balancing reasons. The TSOs operate a continuous scheduling process to ensure the latest market and system information feeds into the actual dispatch.

4.3. Units Under Test in I-SEM

The concept of Within Day and Full Day Tests is not being applied in I-SEM. Testing can be split in to two categories: Significant and Minor testing as defined in EirGrid and SONI Grid Codes below.

Significant Test

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

Minor Test

An Operational Test with a total duration of less than 6 hours in any Trading Day or where 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

All testing requires approval from the TSO. Depending on type of test, Significant or Minor different timelines and criteria for approval will be applied.

All unit types capable of submitting PNs will be required to go under test in I-SEM. 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 unit under test physical notification (UUT PN) via the market participant interface specifying the period that the generating unit is requested to be under test with corresponding test flags. Any PN submission that includes a UUT PN with an associated test flag will require final approval by the TSO before it is accepted in the Market Management System (MMS) and subsequent scheduling runs. Any subsequent modifications to a test PN, including cancellation is also subject to TSO approval.

Once a UUT PN has been approved, the unit is considered 'under test' for all periods that contains a test flag. The UUT PN is fixed for all scheduling runs, meaning that scheduling system 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. Participants may also submit COD with their UUT PN although this will not normally be utilised in the scheduling and dispatch tools during the test period. However, in the event that the TSO must override the scheduling and dispatch tool and manually dispatch a unit away from its test profile for security reasons, the applicable commercial data will apply to the settlement of the TSO action (an inc or dec) in the same way as any other TSO action. 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.

In I-SEM a UUT is not required to go under test for a full trading day and can request to go under test for a subset of half hour Imbalance Settlement Periods. In I-SEM all unit types can go under test with the exception of units which have priority dispatch and which are not dispatchable, units which are not dispatchable and not controllable, or Interconnector Residual Capacity Units.

5. OPTIONS FOR TESTING TARIFFS

This section presents a number of high level options available for the application of testing tariffs for I-SEM. In developing these options the main objective of the TSOs was to incorporate feedback received from Industry over the last number of years on the existing testing tariff design and to ensure that the options presented are simple, easy to understand, transparent and that they account for changes between the SEM and the I-SEM arrangements.

Section 5.1 outlines the proposed number of tariffs for I-SEM. The proposed selection criteria for what tariff should be applied to a UUT are outlined in Section 5.2. The cost components associated with high impact and low impact testing are outlined in Sections 5.3 and 5.4 respectively.

5.1. Tariff Structure

A UUT must provide the TSO with certain information as required by the Grid Codes. Based on this information the TSO will ascertain whether the testing will cause an increased impact above that of normal operation or whether no additional impact is envisaged. If there is an increased impact then the TSOs will require an additional unit or units to be dispatched to make up any shortfall in generation, to ensure that the system demand can be met at all times. In contrast, based on the information provided by the unit, if the testing is determined to result in no additional impact then the TSOs will not require an additional unit or units to be dispatched. Based on these two criteria the TSOs propose that the two tariff structure remains. These two proposed tariffs relate to high impact and low impact testing.

5.2. Selection Criteria

It is proposed that a UUT will automatically be assigned as high impact testing. As part of the approval process with the TSOs, as outlined in the Grid Codes, the UUT will be required to submit information on the testing taking place. The TSOs will then decide whether the testing is determined to be high or low impact based on the decision criteria outlined in Figure 2.

5.2.1. New or Refurbished Units Under Test

It is proposed that any UUT which is new or refurbished¹² will be assigned as high impact for the full duration of their testing.

5.2.2. Existing Units

If an existing unit is carrying out testing in I-SEM then it is proposed that it will automatically default to the high impact tariff. Based on the information provided by the UUT during the approvals process the TSOs will determine if the UUT can move from the high impact tariff to the low impact tariff. The rationale for this is that the UUT will be required to share information with the TSOs on what type of works have been completed as this may require Grid Code testing to be conducted to determine if the UUT is safe to be reconnected to the system.

¹² Refurbished means any unit which has undergone any electrical or mechanical changes.

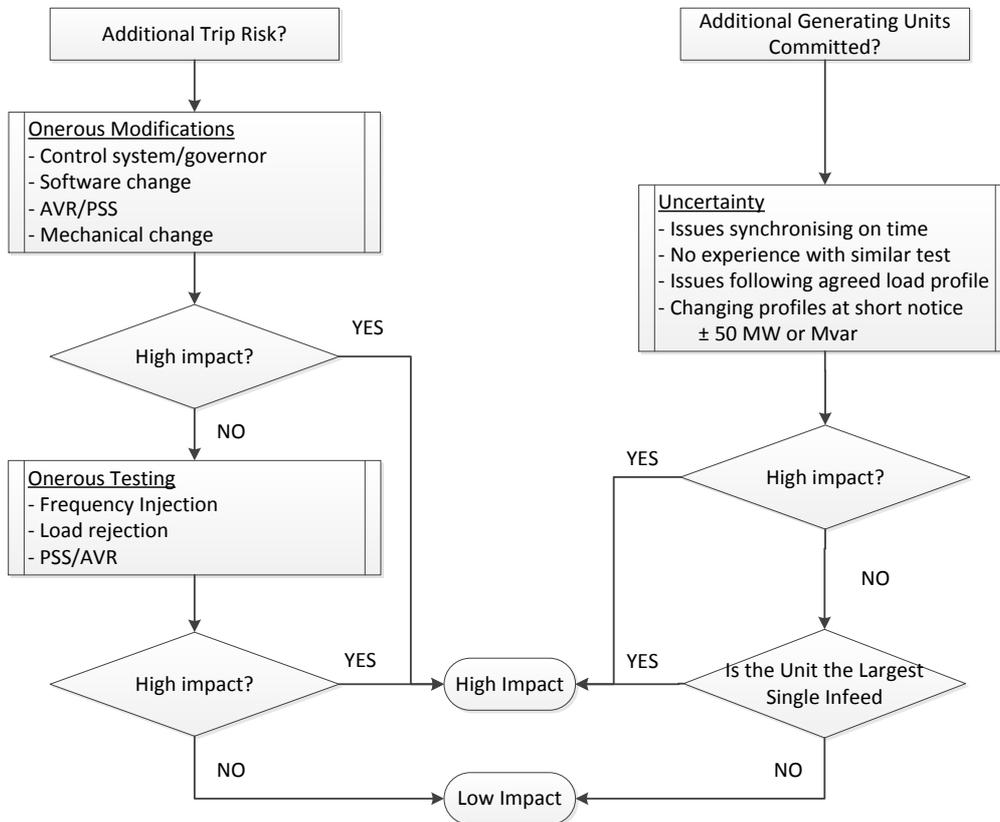


Figure 2: Proposed Tariffs – High and Low Impact

5.3. High Impact Testing

For high impact testing the TSOs will consider that the UUT is unreliable, may not meet the FPNs which it submitted and is at an increased risk of tripping. The cost components associated with high impact testing are determined to be a) unit commitment Imperfection costs b) reserve Imperfection costs c) System Service reserve costs and d) trip charge costs. A summary of the proposed options for how these costs could be recovered can be found in Table 2, while detailed descriptions and the methodologies for these can be found in the following section.

	Option 1 - Retain Current Charge	Option 2 - Remove Charge	Option 3 - Refine Current Charge 1	Option 4 – Refine Current Charge 2
Unit Commitment Imperfection Costs	<p>This is the same as the existing Testing Tariff A i.e. the UUT pays for the additional Imperfection cost of unit commitment as it is determined to be unreliable and may not meet its load profile.</p> <p>The UUT will be dispatched so that no Uninstructed Imbalances should apply since the UUT is paying for additional unit commitment.</p> <p>No SNDs will be levied, except if the unit trips unexpectedly.</p>	<p>This option assumes that the I-SEM and Other System Charges mechanisms recover any unreliability of the UUT. If a UUT behaves reliably then there will be an additional Imperfections cost which the TSOs will pass through to Suppliers.</p> <p>The UUT will be dispatched according to its FPNs, regardless of whether it is achieving these, so Uninstructed Imbalances may apply.</p> <p>SNDs will be applied as if the unit was in normal operation.</p>	<p>This option assumes that the I-SEM and Other System Charges mechanisms recover any unreliability of the UUT. If a UUT behaves reliably then there will be an additional Imperfections cost which the TSOs will pass through to Suppliers.</p> <p>The UUT will be dispatched according to its FPNs, regardless of whether it is achieving these, so Uninstructed Imbalances may apply.</p> <p>SNDs will be applied as if the unit was in normal operation.</p>	<p>This is the same as the existing Testing Tariff A i.e. the UUT pays for the additional Imperfection cost of unit commitment as it is determined to be unreliable and may not meet its load profile.</p> <p>The UUT will be dispatched so that no Uninstructed Imbalances should apply since the UUT is paying for additional unit commitment.</p> <p>No SNDs will be levied, except if the unit trips unexpectedly.</p>
Reserve Imperfection Costs	<p>This is the same as the existing Testing Tariff A i.e. the UUT pays for the additional Imperfection cost of proving reserve if it drives the system reserve requirement as the Largest Single Infeed.</p>	<p>This option assumes that the I-SEM and Other System Charges mechanisms recover any unreliability of the UUT. If a UUT behaves reliably then there will be an additional Imperfections cost which the TSOs will pass through to Suppliers.</p>	<p>This is the same as the existing Testing Tariff A i.e. the UUT pays for the additional Imperfection cost of proving reserve if it drives the system reserve requirement as the Largest Single Infeed.</p>	<p>This option assumes that the I-SEM and Other System Charges mechanisms recover any unreliability of the UUT. If a UUT behaves reliably then there will be an additional Imperfections cost which the TSOs will pass through to Suppliers.</p>
System Services Reserve Costs	<p>This is the same as the existing Testing Tariff A i.e. the UUT pays for the additional System Services cost for the reserve paid to units which are providing the additional requirement. This is on the basis that the UUT drives the system reserve requirement as the Largest Single Infeed.</p>	<p>This option proposes that the UUT does not pay for the additional System Service cost of extra reserve if it drives an increase in the system reserve requirements as the Largest Single Infeed. The TSOs will pass through to Suppliers.</p>	<p>This is the same as the existing Testing Tariff A i.e. the UUT pays for the additional System Services cost for the reserve paid to units which are providing the additional requirement. This is on the basis that the UUT drives the system reserve requirement as the Largest Single Infeed.</p>	<p>This option proposes that the UUT does not pay for the additional System Service cost of extra reserve if it drives an increase in the system reserve requirements as the Largest Single Infeed. The TSOs will pass through to Suppliers.</p>

**Trip Charge
Costs**

This proposes that no provision for a probability of a trip would be made in the Testing Tariff and that any trips are levied automatically through the settlement system. This ensures that UUT which do not trip are not unduly charged through the tariff.

Table 2: Summary of Options for Cost Recovery of High Impact Testing

5.3.1. Unit Commitment Imperfection Costs

Since the UUT is considered to be unreliable and may not meet the FPNs which it nominated the TSOs will remove the UUT from the unit commitment schedule determined from the Security Constrained Unit Commitment (SCUC) application. This will result in an additional unit or units being committed to meet the system demand which will lead to increased system costs. As part of the I-SEM design if a UUT submits FPNs and fails to deliver these then they are incentivised through the imbalance price mechanism. A UUT may decide to 'contract' for the FPNs being produced as part of the test and therefore be subject to the Imbalance Price should they fail to deliver FPNs. The UUT may however decide to 'spill' meaning that they declare an FPN which is greater than their contracted position. The TSOs however have no visibility of the decision taken by the UUT in relation to its contracted position.

5.3.1.1. Option 1 – Retain Current Charge

This option assumes that the I-SEM and OSC design do not fully recover the system costs associated with a UUT. If a UUT is determined to be unreliable, then the TSOs will always commit additional unit(s). If the UUT completes its testing per the declared FPN then there will be additional system costs as additional unit(s) have been committed. As the TSOs cannot predict the reliability of a UUT prior to the test it is therefore proposed that the cost of the additional unit commitment should be borne by the UUT. The proposed methodology by which this cost component will be calculated is the same as that currently used for the Addition Run Hours component of Testing Tariff A as agreed by the RAs in SEM-12-014. This calculation utilises outputs from the annual Imperfections Forecast Plexos model which is approved by the Regulatory Authorities. Here the annual run hours for each unit in the base case model without a UUT are compared to the annual run hours for each unit in the case with a UUT. The additional run hours is the difference in run hours between the two cases and represents the number of hours of generation in a year displaced by the UUT. The model is run over a year to capture as accurately as possible all testing conditions.

The TSO may need to run additional unit(s) to mitigate the impact of the UUT becoming unavailable. The cost of running this additional unit(s) is estimated as the no load cost (€/hr) of the particular unit(s) times its additional run hours. The cost is then summed over all units and converted to a per MWh basis by dividing the total figure by the product of the amount of hours in a year times the size of the UUT. The calculation is then repeated for a number of UUT sizes to provide a range of charges banded by unit registered capacity.

Since an additional unit or units are available should the UUT not deliver per its FPN then the UUT should be issued dispatch instructions consistent with their actual output instead of their FPNs so that they do not incur Uninstructed Imbalance charges.

Furthermore the unit should not incur Short Notice Declaration (SND) charges for re-declaring their availability as sufficient unit(s) are already dispatched and available to meet any shortfall in output. The one exception in this instance is if the UUT drops output unexpectedly or trips. In this instance an SND charge should be levied as the TSOs may be required to make short term actions to ensure system security is maintained, which could significantly increase system costs. The responsibility for ensuring the correct reason code is used is with the UUT as this information will pass automatically to the Other System Charges (OSC) settlement system which calculates SND charges.

Table 3 shows a simplified additional run hour calculation. (Please note the values used in this table are purely for purposes of demonstration and do not represent actual values used in the calculation).

UUT size = 300 MW					
Unit	No Load Cost (€/hr)	Base Case (Run Hours)	Base Case with Unit Under Test (Run Hours)	Additional Run Hours	Cost of Additional Run Hours (€)
		X	Y	X-Y	(X-Y) * No Load Cost
Gen 1	1500	6500	5500	1000	€1,500,000
Gen 2	1300	6000	5350	650	€845,000
Gen 3	3200	7000	6800	200	€640,000
Gen 4	1200	5000	3000	2000	€2,400,000
Gen 5	900	4500	3200	1300	€1,170,000
Total					€6,500,000
Cost per MWh	Total Cost/ [(Hrs in a year) * (UUT MW size)]				€2.49 / MWh

Table 3: Example of Additional Run Hour Calculation

For reference purposes the 2017 cost component associated with unit commitment can be found in Table 1.

5.3.1.2. Option 2 – Remove Charging

This option assumes that the I-SEM and OSC design will recover some of the system costs associated with a UUT. The UUT should declare full availability and will be dispatched according to their FPN, regardless of whether they can achieve this or not. This ensures that the UUT is exposed to the Uninstructed Imbalance charge for failing to deliver on their committed schedule. This charge should recover the additional Imperfection cost of the TSO having to commit additional units(s) due to the unreliability of the UUT.

They will however be times when the system costs are not recovered from the UUT. These periods materialise if the UUT achieves their FPNs. In this example the additional system costs associated with committing the additional unit(s) will not be recovered. These additional unit(s) were required since the TSOs did not know the reliability of the unit in advance of the high impact testing. This additional Imperfections cost would be passed through to Suppliers.

Any downward declarations of availability will be subject to Short Notice Declaration (SND) charges. The responsibility for ensuring the correct reason code is used is with the UUT as this information will pass automatically to the Other System Charges (OSC) settlement system which calculates SND charges.

In the I-SEM systems a charge of €0/MWh or £0/MWh would therefore apply.

5.3.1.3. Option 3 – Refine Current Charge 1

This proposal is the same as outlined in Section 5.3.1.2.

5.3.1.4. Option 4 – Refine Current Charge 2

This proposal is the same as outlined in Section 5.3.1.1.

5.3.2. Reserve Imperfection Costs

If a UUT is determined by the TSOs to be unreliable or at risk of tripping then 100% Primary Operating Reserve and Secondary Operating Reserve will be carried on the system. This is to ensure that if the UUT was to trip unexpectedly that the frequency will return to normal operating levels. Carrying extra reserve in this manner means that the SCUC schedule will deviate further from the FPNs and result in additional Imperfection costs.

5.3.2.1. Option 1 – Retain Current Charge

This option assumes that the I-SEM and OSC design do not fully recover the system costs associated with a UUT. This option involves calculating the additional Imperfection cost arising from carrying additional operating reserve which should be borne by the UUT. The additional Imperfection cost is calculated using the production cost output from a validated reserve constrained model of I-SEM. The modelling is performed using the Plexos modelling tool. The model uses the RAs validated generator dataset to represent the generators in the I-SEM. The additional reserve Imperfections cost is then found by taking the difference in production cost between a base case model with a 'normal' reserve requirement and a model with an additional reserve requirement over and above the 'normal' requirement. The cost is then converted to a per MWh basis by dividing the total figure by the product of the amount of hours in a year times the registered capacity of the UUT. The calculations are then repeated for a number of UUT sizes to provide a range of charges banded by unit size.

A load factor adjustment must also be applied to these rates as this is the load at which the UUT exceeds the normal operating reserve requirement. The load factor adjustment is a percentage of the total MWh outputted when the generating unit under test exceeded this load factor. Based on analysis the average LSI for the previous 5 years (2012 – 2016) was 393 MW, therefore the average Primary Operating Reserve would have been 295 MW. If a UUT is going to export greater than 295 MW then they would drive the reserve requirements and are levied this additional cost.

For reference purposes the 2017 cost component associated with reserve Imperfection costs can be found in Table 1.

5.3.2.2. Option 2 – Remove Charging

This option assumes that the I-SEM and OSC design will recover some of the system costs associated with a UUT. The UUT should declare full availability and will be dispatched according to their FPN, regardless of whether they can achieve this or not. This ensures that the UUT is exposed to the Uninstructed Imbalance charge for failing to deliver on their committed schedule. This charge should recover the additional Imperfection cost of the TSO having to commit additional units(s) due to the unreliability of the UUT.

They will however be times when the system costs are not recovered from the UUT. These periods materialise if the UUT achieves their FPNs. In this example the additional system costs associated with committing the additional unit(s) will not be recovered. These additional unit(s) were required since the TSOs did not know the reliability of the unit in advance of the high impact testing. This additional Imperfections cost would be passed through to Suppliers.

In the I-SEM systems a charge of €0/MWh or £0/MWh would therefore apply.

5.3.2.3. Option 3 – Refine Current Charge 1

This proposal is the same as outlined in Section 5.3.2.1.

5.3.2.4. Option 4 – Refine Current Charge 2

This proposal is the same as outlined in Section 5.3.2.2.

5.3.3. System Services Reserve Costs

Certain units on the system are contracted for and receive a System Services payment for their technical availability regarding the provision of reserve. The extra System Service reserve payments are not captured by the additional reserve Imperfections calculation methodology.

5.3.3.1. Option 1 – Retain Current Charge

This option proposes that it is considered appropriate that the UUT that is causing an incremental increase in operating reserve requirements should cover the incremental cost of increased System Service payments through the testing tariff mechanism.

The UUT should only cover the cost of the increase in operating reserve above the normal operating reserve requirement. Based on analysis the average LSI for the previous 5 years (2012 – 2016) was 393 MW, therefore the average Primary Operating Reserve would have been 295 MW. If a UUT is going to export greater than 295 MW then they would drive the reserve requirements and are levied this additional cost.

By applying the load factor adjustment to the System Services payment rates for operating reserve, a €/MWh value is calculated that can be added to the testing tariff as the additional reserve System Services component. The reserve System Services cost is made up of primary, secondary, and tertiary operating reserve payment rates multiplied by the load factor adjustment appropriate to the particular testing tariff band.

For reference purposes the 2017 cost component associated with System Services reserve costs can be found in Table 1.

5.3.3.2. Option 2 – Remove Charging

This option proposes that the UUT does not pay for the additional System Service cost of extra reserve if it drives an increase in the system reserve requirements as the Largest Single Infeed. Any additional System Services costs arising from additional reserves being made available will therefore become a pass through cost for the TSO and will be borne by Suppliers.

In the I-SEM systems a charge of €0/MWh or £0/MWh would therefore apply.

5.3.3.3. Option 3 – Refine Current Charge 1

This option is the same as 5.3.3.1.

5.3.3.4. Option 4 – Refine Current Charge 2

This option is the same as 5.3.3.2.

5.2.4. Trip Charge

When a unit experiences a sudden loss of output it is referred to as a trip. If the rate of loss is in line with the MW threshold and rate of loss, as set out in Other System Charges Methodology Statement, it is subject to a trip charge. This trip charge is designed to recover the additional system cost of having to re-dispatch more expensive units in the immediate aftermath of the trip to restore the system to safe operating limits.

Any trips are currently automatically levied through the OSC settlement system and this will remain unchanged for I-SEM. The TSOs therefore propose that the simplest option is that no provision would be made in the Testing Tariff and that any trips are levied automatically through the settlement system. This ensures that UUT which do not trip are not unduly charged through the tariff.

5.3. Low Impact Testing

For low impact testing the TSOs will assume that the unit is reliable, will meet the FPNs which it submitted and is not an increased risk of tripping.

The TSOs therefore propose that no testing tariffs should be applied to a UUT categorised as low impact. The current Testing Tariff B includes a provision for a risk of tripping. Similar to Section 5.2.4 the TSOs propose that any UUT which trips unexpectedly should be automatically levied a trip charge through the automated OSC settlement system.

Furthermore the TSOs propose that any SNDs associated with the UUT would continue to be levied through the Other System Charges (OSC) process.

APPENDIX A - ACRONYMS

AVR	Automatic Voltage Regulation
BM	Balancing market
FPN	Final Physical Notification
I-SEM	Integrated Single Electricity Market
MMS	Market Management System
MW	Mega Watt
MWh	Mega Watt hour
OSC	Other System Charge
PN	Physical Notification
PSS	Power System Stabiliser
RA	Regulatory Authority
SCED	Security Constrained Economic Dispatch
SCUC	Security Constrained Unit Commitment
SEM	Single Electricity Market
SND	Short Notice Declaration
TSO	Transmission System Operator
UUT	Unit Under Test