

# Independent Assurance Report on compliance with specified elements of the Scheduling and Dispatch process for the 15 month period ended 31 December 2019

## Use of this report

This report is intended solely for the use of the Directors of EirGrid plc and SONI Limited. While we acknowledge that this report will be published on the EirGrid ([www.eirgridgroup.com](http://www.eirgridgroup.com)), SONI ([www.soni.ltd.uk](http://www.soni.ltd.uk)), and SEMO ([www.semo.com](http://www.semo.com)) websites, it (as per the terms set out in the click through) is for information purposes only and it should not be relied upon by anyone other than the Directors of EirGrid plc and SONI Limited. We accept no liability (including for negligence) to anyone else in connection with this document.





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27 October 2020

Dear Ladies and Gentlemen,

**Independent Assurance Report on compliance with specified elements of the Scheduling and Dispatch process for the 15 month period ended 31 December 2019**

**Introduction**

- We have been engaged by EirGrid plc and SONI Limited (“The Transmission System Operators” (“TSOs”)) to provide an Independent Assurance Report (“Assurance Report”) in respect of compliance with specific regulatory requirements as they relate to specified elements of the scheduling and dispatch process for the period 1 October 2018 to 31 December 2019 (“the period”), in order for the TSOs to complete the required reporting to the Commission for Regulation of Utilities (CRU) in Ireland and the Utility Regulator (UR) in Northern Ireland (each the “Regulator”) to satisfy the EirGrid plc and SONI Limited Licence obligations as set out in paragraph 9 of Condition 10A and Condition 22A of their Transmission System Operator licence agreements respectively.

**Scope of work**

- The specified elements of the scheduling and dispatch process that are included in the scope of this report have been grouped into six “pillars”. These are set out in the table below under the column “In scope items”. The criteria that have been used to measure The Transmission System Operators’ compliance with the specified elements of the scheduling and dispatch process have been set out in the table below, and are hereinafter referred to as “The Requirements”. We have assessed the extent to which The Transmission System Operators, in specified elements of their scheduling and dispatch process, have complied with The Requirements for the period.

		“The Requirements”	
Pillar #	In scope items	Criteria EirGrid	Criteria SONI
1	Priority Dispatch and Cross Zonal Actions	<b>Transmission System Operator Licence (“TSO Licence”)</b> Condition 10A - Para. 4(a)/(b) & 5(f),(i)  <b>Other requirements:</b> SEM-11-062	<b>TSO Licence</b> Condition 22A - Para. 4(a)/(b) & 5(f),(i) Condition 9A  <b>Other requirements:</b> SEM-11-062

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Pillar #	In scope items	Criteria EirGrid	Criteria SONI
2	Dispatch Instructions	<p><b>TSO Licence</b> Condition 10A - Para. 2, 4 and 5</p> <p><b>Other requirements:</b></p> <p>SEM-17-046 I-SEM Policy Parameters and Scheduling and Dispatch Parameters</p> <p>Grid Code CC. 8.2.1</p>	<p><b>TSO Licence</b> Condition 22A - Para. 2, 4 and 5</p> <p><b>Other requirements:</b></p> <p>SEM-17-046 I-SEM Policy Parameters and Scheduling and Dispatch Parameters</p> <p>Grid Code CC. 5.3.1</p>
3	Merit Orders	<p><b>TSO Licence</b> Condition 10A - Para. 3</p> <p><b>Other requirements:</b></p> <p>Grid Code SDC 1.4.7.3 / SDC1.4.7.4 and SDC2.4.2.14</p>	<p><b>TSO Licence</b> Condition 22A - Para. 3</p> <p><b>Other requirements:</b></p> <p>Grid Code SDC 1.4.8.3 / SDC1.4.8.4 and SDC2.4.2.14</p>
4	Operational Constraints	<p><b>TSO Licence</b> Condition 10A - Para. 4(a)(b) &amp; 5(d)</p>	<p><b>TSO Licence</b> Condition 22A - Para. 4(a)(b) &amp; 5(d)</p>
5	Constraint Flagging	<p><b>Trading and Settlement Code – Part B</b> Flagging of Accepted Bids and Offers E.3.3.1</p> <p>Trading and Settlement Code Part B, Appendices, APPENDIX N: Flagging and Tagging, System Operator and</p> <p>Non-Marginal Flagging Paragraph 1-3</p>	<p><b>Trading and Settlement Code – Part B</b> Flagging of Accepted Bids and Offers E.3.3.1</p> <p>Trading and Settlement Code Part B, Appendices, APPENDIX N: Flagging and Tagging, System Operator and</p> <p>Non-Marginal Flagging Paragraph 1-3</p>
6	IT General Controls required to support the areas noted in items 1-5 above	<p>While not specifically discussed in the regulations, maintaining IT General Controls over key systems supporting items 1-5 above is key to the overall testing approach.</p>	

3. For the avoidance of doubt, certain parts of the scheduling and dispatch process are not covered in the scope of this report. These are further detailed in our approach document entitled, “Scheduling and Dispatch process Assurance Engagement approach for the 15 month period ended 31 December 2019” (“The Supplement”) that is appended to this report.
4. The Supplement provides a detailed description of the approach we have adopted to the assurance engagement. In particular, it describes those aspects of the specified elements of the scheduling and dispatch process that we have tested and those which are outside the scope of this assurance engagement. This report should be read in conjunction with the Supplement.
5. We have completed our work in accordance with the Letter of Engagement and addendum, agreed between ourselves and the Transmission System Operators, on 25 September 2020 and 27 October 2020 respectively.
6. The Letter of Engagement includes a clause limiting the total liability of PricewaterhouseCoopers to the Transmission System Operators, to a maximum of 3 times fees or €300,000, whichever is greater (excluding VAT).



7. We have relied on our own knowledge and skills in interpreting The Requirements. We are not legal advisors and have not taken independent legal advice and shall therefore have no responsibility to The Transmission System Operators were a court to interpret or construe The Requirements in a different way from us.
8. Unless the context otherwise requires, words and expressions defined in The Requirements have the same meanings in this report as in the Requirements. The versions relevant to our opinion are:
  - a. EirGrid Transmission System Operator Licence March 2017
  - b. SONI's Licence to Participate in the Transmission of Electricity February 2019
  - c. EirGrid Grid Code Version 8 June 2019
  - d. SONI Grid Code October 2018
  - e. Trading and Settlement Code – Part B Versions 20, 21 and Mod\_09\_19

### **Respective responsibilities of The Transmission System Operators and the Scheduling and Dispatch Auditor**

#### **The Transmission System Operators are responsible for the items set out below:**

9. Defining appropriate criteria against which to assess the Transmission System Operators' performance in relation to the specified elements of the scheduling and dispatch process and applying these consistently (The Requirements);
10. Ensuring that those criteria are relevant and appropriate to the Transmission System Operators and the users of the specified elements of the scheduling and dispatch process;
11. Ensuring that the Transmission System Operators comply with all regulations applicable to the specified elements of the scheduling and dispatch process;
12. Designing, implementing and maintaining internal control procedures that provide adequate control over information in respect of the specified elements of the scheduling and dispatch process;
13. Selecting and applying appropriate policies, and making estimates that are reasonable in the circumstances in respect of the specified elements of the scheduling and dispatch process;
14. Addressing all day to day queries received from participants and/or Regulators;
15. Determining the best way to operate the specified elements of the scheduling and dispatch process having due regard to the safe operation of the grid, including any security considerations;
16. Ensuring that all data published in relation to the specified elements of the scheduling and dispatch process on the EirGrid ([www.eirgridgroup.com](http://www.eirgridgroup.com)), SONI ([www.soni.ltd.uk](http://www.soni.ltd.uk)), and SEMO ([www.sem-o.com](http://www.sem-o.com)) websites is complete and accurate, subject to known system issues and defects as published by SEMO on the Known Issues Report; and
17. Retention of sufficient, appropriate evidence to support the operation of the specified elements of the scheduling and dispatch process.

#### **Responsibilities of the Scheduling and Dispatch Auditor**

18. It is our responsibility to perform appropriate work to enable us to express an opinion on The Transmission System Operators' compliance with The Requirements in respect of the specified elements of the scheduling and dispatch process.

#### **Independence and Quality Control**

19. We complied with the Institute of Chartered Accountants in Ireland ("ICAI") Code of Ethics, which includes independence and other requirements founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour.
20. We apply International Standard on Quality Control (Ireland) 1 and accordingly maintain a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.



## Basis of assurance and scope of work

21. We have performed the reasonable assurance engagement in accordance with the requirements of International Standard on Assurance Engagements 3000 (Revised), 'Assurance engagements other than audits or reviews of historical financial information' issued by the International Auditing and Assurance Standards Board.
22. We have planned and performed our work in accordance with The Supplement, which is appended to this report.
23. In reaching our conclusion we assessed the risk of a material breach of the way the Transmission System Operators operated the specified elements of the scheduling and dispatch process compared with The Requirements, whether caused by fraud or other irregularity or error.

## Other matters

24. The scope of the scheduling and dispatch process audit was initially published on 21 June 2019 by the Transmission System Operators on the SEMO website in a document entitled, "Periodic Audit of the Scheduling and Dispatch Process, its Operation and Implementation". Following more detailed scoping discussions it was agreed with the Transmission System Operators and their Regulatory Authorities (Commission for Regulation of Utilities (CRU) in Ireland and the Utility Regulator (UR) in Northern Ireland)) that the scope of this Assurance Report would differ from the previously published scope. The scope of this Assurance Report is clearly set out in the "Scope of work" section (paragraph 2-8) above. Further detail and a list of items excluded from the scope can be found in paragraphs 5 and 6 of the Supplement.

## Opinion

25. Based on our procedures, in our opinion, in all material respects, The Transmission System Operators have complied with The Requirements as they relate to the specified elements of the scheduling and dispatch process during the 15 month period ended 31 December 2019.

## Use of this report

26. This report is intended solely for the use of the Directors of EirGrid plc and SONI Limited. While we acknowledge that this report will be published on the EirGrid ([www.eirgridgroup.com](http://www.eirgridgroup.com)), SONI ([www.soni.ltd.uk](http://www.soni.ltd.uk)), and SEMO ([www.sem-o.com](http://www.sem-o.com)) websites, it (as per the terms set out in the click through) is for information purposes only and it should not be relied upon by anyone other than the Directors of EirGrid plc and SONI Limited. We accept no liability (including for negligence) to anyone else in connection with this document.
27. The maintenance and integrity of the websites referenced in 26 above, is the responsibility of The Transmission System Operators. The work that we carried out does not involve consideration of the maintenance and integrity of those websites and, accordingly, we accept no responsibility for any changes that may have occurred to this report since it was initially presented on those websites.
28. This report has been prepared on the expectation that The Transmission System Operators will have sufficient experience of the specified elements of the scheduling and dispatch process to understand the scope of our work performed without further background explanation and to evaluate the contents of this report in the context of the scope of our work.

Yours faithfully

PricewaterhouseCoopers

Dublin

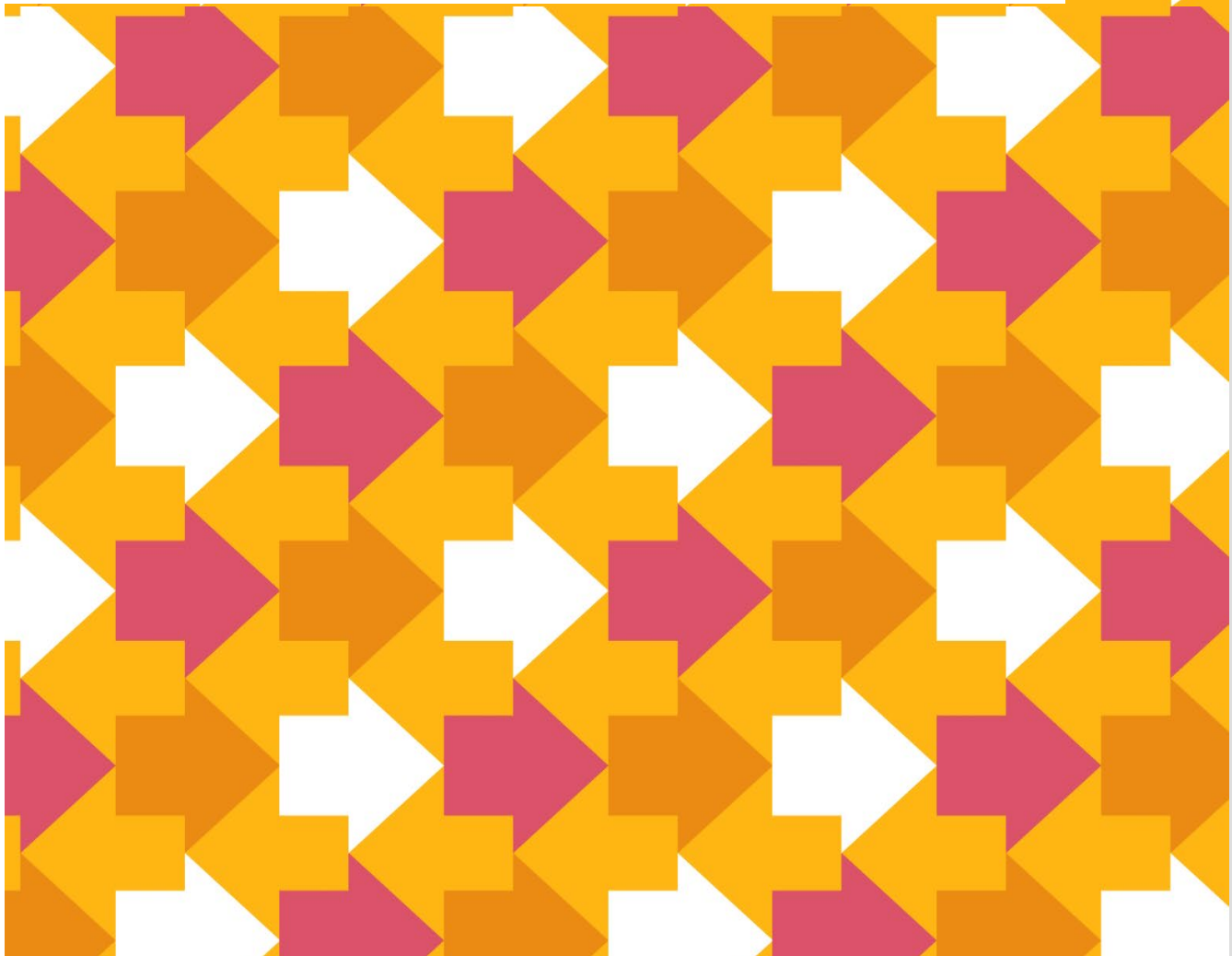
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# Scheduling and Dispatch process Assurance Engagement approach for the 15 month period ended 31 December 2019

27 October 2020

The Supplement

Strictly private and confidential



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# Objective and scope of the Scheduling and Dispatch process assurance engagement

1. The objective of our assurance engagement was to form an independent opinion based on our work as to the compliance of EirGrid plc and SONI Limited (“The Transmission System Operators”), in all material respects, with The Requirements (refer to paragraph 5 below) as they relate to specified elements of the scheduling and dispatch process for the 15 month period ended 31 December 2019 (“the period”).
2. The reasonable assurance engagement was performed in accordance with the requirements of International Standard on Assurance Engagements 3000 (Revised), ‘Assurance engagements other than audits or reviews of historical financial information’ issued by the International Auditing and Assurance Standards Board.
3. This Approach has been prepared by PricewaterhouseCoopers (“PwC”) and accepted by The Transmission System Operators as the basis for the current period’s engagement, as set out in the contractual arrangements in place between PwC and The Transmission System Operators.
4. The “scheduling and dispatch process” is the overall process resulting from the multiple inputs, processes and outputs which enable The Transmission System Operators to operate a secure system and efficient balancing market. It is a continuous process managed in a coordinated manner from the Transmission System Operators’ Control Centres using a range of operational systems, processes and procedures.
5. The specified elements of the scheduling and dispatch process that are included in the scope of this report have been grouped into six “pillars”. These are set out in the table below under the column “In scope items”. The criteria that have been used to measure The Transmission System Operators’ compliance with the specified elements of the scheduling and dispatch process have been set out in the table below (“The Requirements”). We have assessed the extent to which The Transmission System Operators, in specified elements of their scheduling and dispatch process, have complied with The Requirements for the period.

Pillar #	In scope items	“The Requirements”	
		Criteria EirGrid	Criteria SONI
1	Priority Dispatch and Cross Zonal Actions	<b>Transmission System Operator Licence (“TSO Licence”)</b> Condition 10A - Para. 4(a)/(b) & 5(f),(i)  <b>Other requirements:</b> SEM-11-062	<b>TSO Licence</b> Condition 22A - Para. 4(a)/(b) & 5(f),(i) Condition 9A  <b>Other requirements:</b> SEM-11-062
2	Dispatch Instructions	<b>TSO Licence</b> Condition 10A - Para. 2, 4 and 5  <b>Other requirements:</b> SEM-17-046 I-SEM Policy Parameters and Scheduling and Dispatch Parameters  Grid Code CC. 8.2.1	<b>TSO Licence</b> Condition 22A - Para. 2, 4 and 5  <b>Other requirements:</b> SEM-17-046 I-SEM Policy Parameters and Scheduling and Dispatch Parameters  Grid Code CC. 5.3.1



Pillar #	In scope items	Criteria EirGrid	Criteria SONI
3	Merit Orders	<b>TSO Licence</b> Condition 10A - Para. 3  <b>Other requirements:</b>  Grid Code SDC 1.4.7.3 / SDC1.4.7.4 and SDC2.4.2.14	<b>TSO Licence</b> Condition 22A - Para. 3  <b>Other requirements:</b>  Grid Code SDC 1.4.8.3 / SDC1.4.8.4 and SDC2.4.2.14
4	Operational Constraints	<b>TSO Licence</b> Condition 10A - Para. 4(a)(b) & 5(d)	<b>TSO Licence</b> Condition 22A - Para. 4(a)(b) & 5(d)
5	Constraint Flagging	<b>Trading and Settlement Code – Part B</b> Flagging of Accepted Bids and Offers E.3.3.1  Trading and Settlement Code Part B, Appendices, APPENDIX N: Flagging and Tagging, System Operator and  Non-Marginal Flagging Paragraph 1-3	<b>Trading and Settlement Code – Part B</b> Flagging of Accepted Bids and Offers E.3.3.1  Trading and Settlement Code Part B, Appendices, APPENDIX N: Flagging and Tagging, System Operator and  Non-Marginal Flagging Paragraph 1-3
6	IT General Controls required to support the areas noted in items 1-5 above	While not specifically discussed in the regulations, maintaining IT General Controls over key systems supporting items 1-5 above is key to the overall testing approach.	

6. In agreement with The Transmission System Operators, and for the purposes of clarity, items excluded from the scope of our assessment include:

- The algorithms associated with the optimisation engines, which produce the Long-Term Scheduling (“LTS”), Real Time Commitment (“RTC”) and Real-Time Dispatch (“RTD”) schedules, used in the scheduling and dispatch process;
- The Imbalance Pricing process which takes place after the scheduling and dispatch process has ended;
- Validation of data submitted to the Transmission System Operators by participants;
- Inputs such as forecasts which are provided by third parties;
- Inputs such as transmission and generator outage plans;
- The derivation of operational constraints;
- Actions taken with market participants by the Transmission System Operators to resolve performance issues during the scheduling and dispatch process;

- Resolution and validation of known system issues and defects which were not resolved in advance of the Revised Market Arrangements go-live<sup>1</sup>;
- An assessment of the compliance of the Transmission System Operators in relation to any regulations other than those specifically referenced in the table above as documented in paragraph 5 of this document;
- Any regulations which are cross referenced within the regulations listed as the criteria but not specifically identified as criteria themselves, other than those specifically referenced in the table above as documented in paragraph 5 of this document;
- Validation that data published in relation to the specified elements of the scheduling and dispatch process on the EirGrid ([www.eirgridgroup.com](http://www.eirgridgroup.com)), SONI ([www.soni.ltd.uk](http://www.soni.ltd.uk)), and SEMO ([www.sem-o.com](http://www.sem-o.com)) websites is complete and accurate unless specifically included in testing procedures, for example, Operational Constraint Updates are specifically included and referenced in procedures 31-34 of this document;
- An assessment of the engineering decisions that The Transmission System Operators make when actioning internal operating procedures relevant to the specified elements of the scheduling and dispatch process; and
- Validation that system security has been maintained at all times.

## Approach

7. Our approach consisted of the following, in respect of The Transmission System Operators' operation of the specified elements of the scheduling and dispatch process:

- a) obtaining an understanding of the internal operating procedures that The Transmission System Operators have in place that relate to the use of specified elements of the scheduling and dispatch process and/or the Information Technology General Controls ("ITGCs") supporting the relevant computer systems as defined in paragraph 38 below ("the in scope systems");
- b) testing on a sample basis, to the extent we considered necessary to support our opinion over The Transmission System Operators' compliance with The Requirements over the specified elements of the scheduling and dispatch process, the operation of the ITGCs supporting the relevant computer systems and/or internal operating procedures during the period; and
- c) testing on a sample basis, to the extent that we considered necessary to support our opinion over The Transmission System Operators' compliance with The Requirements over the specified elements of the scheduling and dispatch process, certain data processed by the relevant computer systems and/or internal operating procedures during the period.

8. We designed our testing to provide reasonable assurance that in our opinion, in all material respects, The Transmission System Operators have complied with The Requirements over the specified elements of the scheduling and dispatch process during the period.

9. In undertaking our assessment, we assessed the risk of a material non-compliance with The Requirements of the areas within the scope of our assurance engagement. In areas where we have identified specific risks, or where weaknesses have been identified in the operation of specific internal controls, the tests undertaken have been supplemented by further substantive tests of detail of the relevant underlying data. Our assessment of risks is presented in Appendix A below.

10. We have selected a sample of Settlement Days for testing in the period. The selection of the particular days reviewed was based on our assessment of risk. It represented a mixture of "normal" days and other days where we identify unusual factors (e.g. outages, Amber Alerts, Generator Trips, weekends, peak wind days or days around a specific event) which, in our view, represent a risk as to compliance with internal operating procedures.

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<sup>1</sup> Any known system issues and defects which were a factor in the completion of the testing procedures performed over the specified elements of the scheduling and dispatch process were acknowledged and listed in the Assurance Report, where necessary.

11. Throughout the engagement, we have considered the results of our work and the impact on the specified elements of the scheduling and dispatch process and updated our risk assessment and determined appropriate responses where additional risks have been identified.

## Materiality

12. We have planned and performed our assurance engagement so as to be able to provide reasonable assurance that The Transmission System Operators have operated the specified elements of the scheduling and dispatch process in all material respects in accordance with The Requirements.

13. We considered a failure on the Transmission System Operators' part to comply with The Requirements as being material if, in our opinion, a reasonable professional person, on consideration of the TSOs' adherence to The Requirements, would form a different view as to whether the TSOs have complied with The Requirements. In applying this judgement, we have taken into account the following quantitative and qualitative factors to conclude on materiality:

- a) the extent to which the actual outcome would have been different had the principles set out in The Requirements been applied;
- b) the surrounding circumstances at the time(s) of any failure to comply with The Requirements;
- c) the aggregate impact in the period of any failures to comply with The Requirements; and
- d) the relative significance of the particular provision of The Requirements that the TSOs have failed to comply with.

## More detailed description of work undertaken

14. The work that we have carried out on the main pillars is set out below.

### Pillar 1: Priority Dispatch and Cross Zonal Actions

The following procedures have been designed to assess the TSOs' compliance with The Requirements for Pillar 1: Condition 10A - Para. 4(a)/(b) & 5(f)/(i) of the EirGrid TSO licence; Condition 22A - Para. 4(a)/(b) & 5(f)/(i) and Condition 9A of the SONI TSO Licence; and SEM-11-062 Principles of Dispatch and the Design of the Market Schedule in the Trading and Settlement Code SEM Committee Decision Paper.

#### 15. Accuracy of Participants reflected in the Market Management System ("MMS")/Resource balancing

For a sample of participants from the Resource Balancing table maintained by the Registration team:

- a. Checked that the participant was accurately reflected in MMS in line with its fuel type and where a participant is noted as a Priority Dispatch unit on the Resource Balancing table, if it was assigned the correct Priority Dispatch category in line with the Hierarchy of SEM-11-062.

For a sample of participants from the LTS run:

- b. Checked that participants in MMS were accurately noted as Priority Dispatch/non priority dispatch participants as per the Resource balancing listing (maintained by Registration team).

## 16. Priority Dispatch participants in LTS runs

For a sample of Priority Dispatch participants from LTS runs:

- a. Checked that the dispatchable units have been included in the schedule for their Physical Notification quantity; and
- b. Checked that the non-dispatchable units have been scheduled to their forecasted availability.

## 17. Dispatch Instructions for Dispatchable participants

For a sample of dispatch instructions:

- a. Confirmed that Dispatchable Priority Dispatch units have been dispatched for the same MW as their submitted Physical Notifications/Actual availability.

## 18. Curtailment Events

For a sample of Curtailment dispatch instructions checked that:

- a. There was a valid reason for the curtailment;
- b. Before a curtailment event occurred, other options were considered, including but not limited to, initiating Interconnector trades or turning down conventional units to their minimum generation where applicable;
- c. Wind units were curtailed in line with curtailment categories (Category 1-3);
- d. All units in the curtailment category were dispatched; and
- e. Set points issued to Priority Dispatch units were done on a pro rata basis.

## 19. Constraint Events

For a sample of Constraint dispatch instructions checked that:

- a. There was a valid reason for the constraint;
- b. Before a constraint occurred, other options were considered when applicable;
- c. All units in the area that could alleviate the issue were dispatched; and
- d. Set points issued to Priority Dispatch units were done on a pro rata basis.

## Pillar 2: Dispatch Instructions (+Schedules)

The following procedures have been designed to assess the TSOs' compliance with The Requirements for Pillar 2: Condition 10A - Para. 2, 4 and 5 of the EirGrid TSO licence; Condition 22A - Para. 2, 4 and 5 of the SONI TSO licence, SEM-17-046 I-SEM Policy Parameters and Scheduling and Dispatch Parameters and EirGrid Grid Code CC. 8.2.1 / SONI Grid Code CC. 5.3.1.

### 20. Frequency (Condition 10A Para 2 / 22A Para 2 and EirGrid Grid Code CC. 8.2.1 /SONI Grid Code CC. 5.3.1)

For the period under review, analysed if frequency remained within the normal limits set out in the respective EirGrid (CC.8.2.1) and SONI Grid Code (CC.5.3.1). Any periods outside of the normal operating limits were considered for inclusion in our sample selection as these dates were considered, in our view, to represent a risk as to the TSOs' compliance with internal operating procedures.

### 21. Physical Notifications (Condition 10A Para 2(a)(i), 4 and 5(b) / 22A Para 2(a)(i), 4 and 5(b))

For a sample of generators' Physical Notifications in the MMS:

- a. Checked that the generator is listed on the Physical Notification listing on the Market Participant Interface ("MPI"); and
- b. Checked that the Physical Notifications information used in scheduling is accurate based on the Market Participant Information submitted.

For a sample of generators reflected on the MPI Physical Notification listings:

- c. Checked that the generators are listed on the Physical Notification listing in MMS.

### 22. Generators declaring unavailable (Condition 10A Para 2(a)(ii) / 22A Para 2(a)(ii))

For a sample of Generators that declared as unavailable as per submitted participant information:

- a. Checked that generators that declared unavailable were not included in the LTS schedule run for period of unavailability declared;
- b. Checked that generators that declared unavailable did not receive a dispatch Instruction for the period of unavailability declared.

For a sample of generators scheduled in an LTS schedule:

- c. Checked that the generator did not declare as unavailable as per availability notices.

### 23. Generation units not subject to central dispatch (Condition 10A Para 2(a)(iv) / 22A Para 2(a)(iv))

For a sample of LTS schedules inspected that units not subject to central dispatch (Fixed Generation) were scheduled.

### 24. Transmission System Outage (Condition 10A Para 2(b) / 22A Para 2(b))

Observed the automated process flow of Transmission System Outages in the RTC and RTD schedules to ensure that outages are taken into account in schedules accurately.

### 25. Daily forecast demand (Condition 10A Para 4 and 5(a) / 22A Para 4 and 5(a))

For a sample of time periods in an LTS schedule:

- a. Checked that the GDY Scheduled Demand Forecast reconciles to the scheduled Load forecast as included on the selected LTS schedules.

**26. Scheduling and Dispatch Policy Parameters (Condition 10A Para 4 and 5(c) / 22A Para 4 and 5(c) and SEM-17-046 I-SEM Policy Parameters and Scheduling and Dispatch Parameters)**

For a sample of time periods within an LTS schedule:

- a. Checked that the value as per the Long-Notice Adjustment Factor (“LNAF”) MMS display matched the LNAF as set out in the Single Electricity Market Committee Decision paper published on the SEM-17-046 I-SEM Policy Parameters and Scheduling and Dispatch Parameters; and
- b. Checked that the value as per the System Imbalance Flattening Factors (“SIFF”) MMS display matched the SIFF as set out in the Single Electricity Market Committee Decision paper published on the SEM-17-046 I-SEM Policy Parameters and Scheduling and Dispatch Parameters.

**27. Generators Technical Offer data (Condition 10A Para 4 and 5(e) / 22A Para 4 and 5(e))**

For a sample of dispatch instructions:

- a. Checked that generators received dispatch instructions in line with their submitted Technical Offer data (Maximum generating capability, Minimum generating capability).

**28. Interconnector Reference Programs (“ICRPs”) (Condition 10A Para 4 and 5(f) / 22A Para 4 and 5(f))**

For a sample of ICRPs:

- a. Checked that the ICRPs matched to the MW scheduled for the interconnectors in the LTS runs; and
- b. Checked that the ICRPs are within the operating limits of the interconnectors.

**29. Operating Security Standards procedures on Training (Condition 10A Para 4 and 5(h) / 22A Para 4 and 5(h))**

For a sample of Grid Controllers:

- a. Checked that a certification/recertification has been issued to each grid controller sampled to authorise them to work in the Control Centre.

## Pillar 3: Merit Orders

The following procedures have been designed to assess the TSOs’ compliance with The Requirements for Pillar 3: Condition 10A - Para. 3 of the EirGrid TSO licence; Condition 22A - Para. 3 of the SONI TSO licence and EirGrid Grid Code SDC 1.4.7.3 / SDC1.4.7.4 and SDC2.4.2.14 and SONI Grid Code SDC1.4.8.3/ SDC1.4.8.4 and SDC2.4.2.14

The strict adherence of dispatching in line with the Merit Order is not always feasible. The Grid Codes outline acceptable reasons for deviating from the Merit Order. We therefore considered if dispatch was in line with the Merit Order in the context of the Grid Codes.

If we noted in our sample of dispatch instructions tested that a potential deviation from the merit order occurred and a more expensive unit was dispatched while a cheaper unit was available, an assessment was undertaken to confirm if the cheaper unit would have been able to respond to the same dispatch instruction based on its technical capability. If the cheaper unit would have been technically capable to respond to the dispatch instruction an assessment was completed to confirm if dispatching the more expensive unit was material to the scheduling and dispatch process as a whole.

### 30. Merit Orders

For a sample of dispatch instructions:

- a. Checked that dispatch instructions were issued in line with the Merit Order (taking into account acceptable deviations from the Merit Order as outlined in the Grid Code); and
- b. Checked that dispatch instructions were issued by the TSOs after market gate closure. For those noted as Long Notice actions, inspected that dispatch instructions were issued by the TSOs in line with the generator's Technical Offer Data and heat state.

## Pillar 4: Operational Constraints

The following procedures have been designed to assess the TSOs' compliance with The Requirements for Pillar 4: Condition 10A - Para. 4(a)(b) & 5(d) of the EirGrid TSO licence; Condition 22A - Para. 4(a)(b) & 5(d) of the SONI TSO licence. Please note that the procedures included in paragraphs 31 and 32 below are not a specific requirement as per the TSO Licences. However, they were included in the procedures as they support the testing performed under paragraphs 33 and 34 below.

### 31. Publication of weekly Operational Constraints Updates

Checked that a sample of Weekly Operational Constraints Updates as used in the LTS schedule has been published to the SEMO website timely (before or on the effective date).

### 32. Publication of monthly Operational Constraints Updates

Checked that a sample of Monthly Operational Constraints Updates as used in the LTS schedule has been published to the SEMO/EirGrid website timely (before or on the effective date).

### 33. Accuracy of Constraints taken into account in the scheduling and dispatch process

For a sample of constraints published on the Monthly Operational Constraints Updates:

- a. Checked that the constraints had been inputted into MMS for a sample of LTS runs;
- b. Checked that the constraints were accurately set up in MMS (TCG Limits Constraints) for a sample of LTS runs;
- c. Checked that the constraints had been accurately used/processed by the optimizer for a sample of LTS runs; and
- d. Checked that the constraints had accurately been actioned and maintained by the Control Centre in real time dispatch.

### 34. Completeness of Constraints published to participants

Confirmed for a sample of constraints included in the MMS that each constraint has been published on the Monthly Operational Constraints Update (active constraints) or the relevant scheduling and dispatch procedure document (inactive constraints).

# Pillar 5: Constraint Flagging

The following procedures have been designed to assess the TSOs' compliance with The Requirements for Pillar 5: Trading and Settlement Code ("TSC") – Part B, Flagging of Accepted Bids and Offers E.3.3.1 and TSC Part B, APPENDIX N: Flagging and Tagging, System Operator and Non-Marginal Flagging Paragraph 1-3

## 35. Creation of System Operator flags

TSC – Part B, Flagging of Accepted Bids and Offers E.3.3.1 and TSC Part B, APPENDIX N: Flagging and Tagging, System Operator and Non-Marginal Flagging Paragraph 1-2

For a sample of Constraints in a selection of imbalance periods:

- a. Confirmed that flags were created accurately in line with constraint logic; and
- b. Confirmed that the Non-Energy flag listing, for use in settlement, was complete by ensuring that all units that met the constraint logic as per procedure 35a above were reflected on the listing for the constraint sampled.

For a sample of Constraints in an RTD run:

- c. Confirmed that each constraint has been published on the Monthly Operational Constraints Update (active constraints) or has been turned off in pricing (inactive constraints).

## 36. Creation of Non-Marginal flags

TSC – Part B, Flagging of Accepted Bids and Offers E.3.3.1 and TSC Part B, APPENDIX N: Flagging and Tagging, System Operator and Non-Marginal Flagging Paragraph 3

For a sample of generators Non-Marginal Flagged in a selection of imbalance periods:

- a. Confirmed that the generators were operating within the correct criteria to be flagged as Non-Marginal for the RTD run.

For a sample of generators not Non-Marginal Flagged in a selection of imbalance periods:

- b. Confirmed that generators were operating within the correct criteria to not be flagged as Non-Marginal for the RTD run.



## Pillar 6: IT General Controls Testing

37. The majority of transactions regarding input and output of data are sent and processed electronically. Consequently, to the extent necessary to support the testing approach, we have tested the design and operating effectiveness of the relevant IT controls in place during the period over these areas.

38. Our testing focused on the following areas, where applicable, in respect of controls owned and operated by the TSOs over the in-scope systems - being MMS, Electronic Dispatch Instruction Logger ("EDIL"), Wind Dispatch Tool and Interconnector Management Platform ("ICMP").

- a. Program development;
- b. Program changes;
- c. Computer Operations; and
- d. Access to programs and data.

We noted a number of IT controls which could not be adequately tested. In these cases, we were required to complete further substantive procedures. This is noted in Appendix A. Based on the additional substantive procedures completed, and considering the substantive tests undertaken within pillars 1 to 5, sufficient evidence was obtained to support our opinion.

# Appendix A – Risk and Response

In the table below we have outlined our assessment of the key risks identified and the work completed to address those risks. Where relevant, we have also provided detail on the specific results of our work completed. These matters, and any comments we make on the results of our procedures thereon, were addressed in the context of our engagement as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters. This is not a complete list of all risks identified by our engagement.

Risk	Our response
<p><b>First year of Assurance being undertaken:</b></p> <p>As this was the first period that The Transmission System Operators were required to obtain formal Assurance over the specified elements of the scheduling and dispatch process, there was a risk of lack of formal standardised documentation being available to substantiate explanations given by The Transmission System Operators or evidencing of controls. This risk was increased in the first six months after go-live of the Revised Market Arrangements.</p>	<p>We approached this risk by firstly obtaining a detailed understanding of the underlying subject matter, which included obtaining evidence for an individual sample relating to each proposed audit test. From this and subsequent testing, we noted the following:</p> <ul style="list-style-type: none"> <li>a. There was a lack of formal documentation to support a number of areas within our ITGC testing. As a result, we performed additional substantive procedures to obtain the necessary audit evidence during the in-scope period;</li> <li>b. Through our testing procedures detailed in paragraph 19c, for each instance where a wind dispatch unit in the Local Constraint group was not dispatched a reason and supporting evidence, where required, were requested from the TSOs to explain the deviations. In one instance we noted that one windfarm in a local constraint group was not dispatched for a local constraint due to a suspect signal. As all signal data information was not retained for the period, the reason for the exclusion could not be confirmed. We assessed the materiality of this instance and concluded that it was not material.</li> </ul>
<p><b>Known Issues affecting the scheduling and dispatch process:</b></p> <p>The Revised Market Arrangements went live on 1 October 2018. There was a risk of system issues and defects not resolved in advance of go-live of the Revised Market Arrangements. System issues and Defects can have an impact on the scheduling and dispatch process.</p> <p>Known system issues and defects are published by SEMO on the Known Issues Report.</p>	<p>Through discussions with The Transmission System Operators we identified any known issues in the systems in advance of go-live applicable to the scheduling and dispatch process and reviewed the SEMO published Known Issues Reports for the period.</p> <p>During our testing no “Known Issues” were relevant to the specific samples selected for the Assurance procedures undertaken.</p>
<p><b>Recreation of Merit Orders:</b></p> <p>As per the TSOs’ Licence obligations, they are required to operate a Merit Order. The Merit Order is effectively a user interface tool within the MMS which ranks available plant in price order i.e. economic Merit Order. Merit Orders are</p>	<p>The TSOs created an excel based tool to recreate the Incremental and Decremental Online Merit Orders for sample dates/times. In order to recreate the Merit Orders for the time period, the following inputs, submitted by participants and available within MMS, were used: RTD Generator Status,</p>

Risk	Our response
<p>refreshed in real time within MMS each 5 minutes (Online Merit Orders) and 15 minutes (Offline Merit Orders). The Real Time Merit Orders are used by the dispatch engineer in the Control Centre as a guide for dispatching available plant at the most economical prices as and when needed while operating a safe and secure network.</p> <p>These Merit Order displays are not stored or backed up once refreshed in MMS. However, as the Merit Orders are merely a visual representation of data that is available within MMS, it is possible to recreate the Merit Orders by using the data sets stored in “save cases” for sample days and time periods.</p> <p>The recreation of this system output poses the risk that the recreated Merit Orders are not reflective of the Merit Orders used by the Control Centre in real time for the audit period, 1 October 2018 – 31 December 2019.</p>	<p>Generator Cost Curves and Generator Operating Limits.</p> <p>The TSOs created an excel based formula template to recreate the Offline Slow Start and Fast Acting Merit Orders. In order to recreate the Merit Orders for the time period, the following inputs, submitted by participants and available within MMS, were used: RTD Generator Start-up Costs, Generator Status, EDIL Real Time output and declaration data, Generator Cost Curve and Generator Operating data.</p> <p>The Online and Offline Merit Order Tools/formulas were tested by us by comparing the results provided by the tools/formulas to real time merit orders in the system. These tools were concluded to be fit for purpose for use in the assurance procedures.</p>
<p><b>Engineering decisions not most economical:</b></p> <p>During dispatch decision making other factors, beyond price (Merit Order), need to be considered. These factors are dynamic, interdependent and may be complementary or conflicting, for example, ensuring constraints are met, the required reserve is kept on the system and ensuring frequency remains within the correct parameters. While such decisions will achieve the requirements set out in other obligations, they may not always be the most economical.</p> <p>The reasons for deviating from the Merit Order are not logged by dispatch engineers in real time. This poses a risk that evidence will not be available to support the decisions made when deviating from the Merit Order.</p>	<p>The strict adherence to dispatch in accordance with the merit order will not always be possible as the network needs to be operated safely and securely. For each instance where the most economical unit was not dispatched a reason and supporting evidence, where required, were requested from the TSOs to explain the deviations. We completed procedures over these reasons including assessing if the deviations fell within the acceptable deviations allowed by the Grid Codes.</p> <p>In one instance where the TSOs were not able to provide detail of the reason for deviating from the Merit Order and a more expensive unit was dispatched while a cheaper unit was available, we undertook an assessment which confirmed that the cheaper unit would have been able to respond to the same dispatch instruction based on its technical capability. We then assessed the materiality of this instance and its impact and concluded that it was not material.</p> <p>No material deviations have been identified during testing.</p>

Risk	Our response
<p><b>Errors in manual input data relating to Constraints:</b></p> <p>Constraints are manually entered into the systems supporting the scheduling and dispatch process by the TSOs.</p> <p>Due to the manual nature of the process, there is a risk that the TSOs may inadvertently have input errors.</p> <p>Such errors may have an impact on the scheduling and dispatch process and result in a risk of errors in the schedules produced and subsequent dispatch instructions.</p>	<p>The Licence Condition 10A para 4 (a)/(b) and 5(d) of the EirGrid TSO licence and Licence Condition 22A para 4(a)/(b) and 5(d) of the SONI TSO licence requires that constraints are appropriately scheduled and dispatched. To address the risk of inaccurate or incomplete input of constraints into the scheduling and dispatch systems, we performed tests over a sample of days to agree the actual constraints in the scheduling and dispatch systems to the expected constraints published on the EirGrid website (<a href="http://www.eirgridgroup.com">www.eirgridgroup.com</a>) in the Monthly Operational Constraints Update or the relevant scheduling and dispatch procedure document as applicable. We also agreed a sample of expected constraints to the scheduling and dispatch systems. These tests are detailed in paragraphs 33b and 34 of this document.</p> <p>Individual units are mapped to each constraint. Our test procedures included checking that the units associated with the constraint included in the schedules produced by the scheduling and dispatch system agreed to the expected units for that constraint and that both agreed to the subsequent dispatch instructions. From the sample selected, we identified two instances whereby the units mapped to the constraint differed between the scheduling and dispatch system and the expected constraints.</p> <p>The potential impact of these two findings could have been that:</p> <ol style="list-style-type: none"> <li>a. A unit which should have been considered to fulfil the constraint was not used; and/or</li> <li>b. The most economical unit was not used to fulfil the constraint; and/or</li> <li>c. The published information to the market was incorrect and an individual unit makes decisions on their market involvement based on this incorrect information.</li> </ol> <p>However, in both instances, the constraint itself was correctly scheduled and dispatched on the system which is in line with the specific licence conditions noted above for the TSOs respectively and we concluded that the incorrect mapping of units for two samples was not a material breach of the TSOs' license agreements.</p>
<p><b>Severe System failures (failure of the scheduling and dispatch systems and other events that prevented the TSOs from utilising the in-scope systems to complete the scheduling and dispatch processing for a continuous period of 24 hours or more):</b></p>	<p>Through discussion with The Transmission System Operators, and review of:</p> <ol style="list-style-type: none"> <li>a. SEMO publications;</li> <li>b. Meeting minutes of the Board of Directors; and</li> </ol>

Risk	Our response
<p>Severe System failures may require the operations staff to:</p> <ul style="list-style-type: none"> <li>- Perform certain actions and subsequently recover systems and potentially data; or</li> <li>- Take special decisions to ensure continuity of the scheduling and dispatch process.</li> </ul> <p>Such events increase the risk of error or actions that are not consistent with The Requirements.</p>	<p>c. System data</p> <p>we have identified no such severe system failures or events impacting the period.</p> <p>We did note one system failure on 12-13 June 2019. However, this does not meet the definition of a severe system failure as the in-scope systems were utilised for scheduling and dispatch purposes during the period subject to the system failure.</p>
<p><b>Operation of the scheduling and dispatch process during prolonged planned computer system outages (planned outages of the scheduling and dispatch computer systems that prevented the TSOs from utilising the inscope systems to complete the scheduling and dispatch processing for a continuous period of 24 hours or more):</b></p> <p>Scheduling and dispatch systems outages can be planned or unplanned and occur due to various reasons. Unplanned outages for a continuous 24 hour period or more are regarded as system failures.</p> <p>The duration of planned outages can vary and consequently The Transmission System Operators response will depend on the conditions existing during the outage.</p> <p>During some outages data is required to be input manually into the system and there is a greater risk of error than where this is performed electronically using a stable and proven system. Also, where an outage, including an outage of communication links, requires fall back to manual processes there is again a greater risk of error as operations staff implement processes they are less familiar with.</p>	<p>Through discussion with The Transmission System Operators, and review of:</p> <ul style="list-style-type: none"> <li>a. SEMO publications;</li> <li>b. Meeting minutes of the Board of Directors; and</li> <li>c. System data</li> </ul> <p>we have identified no such system failures or events impacting the period.</p>

## Appendix B – Glossary of terms

<b>CRU</b>	Commission for Regulation of Utilities
<b>EDIL</b>	Electronic Dispatch Instruction Logger
<b>ICAI</b>	Institute of Chartered Accountants in Ireland
<b>ICMP</b>	Interconnector Management Platform
<b>ITGCs</b>	Information Technology General Controls
<b>LNAF</b>	Long-Notice Adjustment Factor
<b>LTS</b>	Long-Term Scheduling
<b>MMS</b>	Market Management System
<b>MPI</b>	Market Participant Interface
<b>MW</b>	MegaWatt
<b>PwC</b>	PricewaterhouseCoopers
<b>RTC</b>	Real Time Commitment
<b>RTD</b>	Real-Time Dispatch
<b>SIFF</b>	System Imbalance Flattening Factors
<b>TSC</b>	Trading and Settlement Code
<b>TSOs</b>	Transmission System Operators, EirGrid plc and SONI Limited
<b>UR</b>	Utility Regulator

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