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The background of the slide is a photograph of a wind farm. Several large, three-bladed wind turbines are visible, standing on tall metal towers. They are situated in a field of golden-brown grass under a clear blue sky with a few wispy clouds. The turbines are arranged in a line that recedes into the distance.

SEM Market Audit

Independent Market Auditor's Report
For the year ended 31 December 2016

Date 3 April 2017



Market Auditor Report – Notice re Distribution and Publication

This notice concerns the Market Auditor Report to the Commission for Energy Regulation (CER) and Utility Regulator for Northern Ireland (UR) (together the Regulatory Authorities (the RAs)) on the SEM Market Audit for the 12 months ended 31 December 2016 dated 3 April 2017 (the "Report").

This notice does not apply to the RAs or Parties to the Code who have signed the "Terms of Release to the Parties to the Code" letter (including their employees acting within the scope of their employment duties).

The requirement for the SEM Market Audit is set out in the Single Electricity Market (SEM) Trading & Settlement Code ("the Code") designated on 3 July 2007 and as amended from time to time. This Report was prepared by Deloitte (a partnership established in Ireland and with its registered address at Deloitte & Touche House, Earlsfort Terrace, Dublin 2, Ireland) ("Deloitte").

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No work has been carried out nor have any enquiries of RAs or Single Electricity Market Operator management been made since 23 February 2017. The Report does not incorporate the effects, if any, of any events or circumstances which may have occurred or information which may have come to light subsequent to that date. Deloitte makes no representation as to whether, had Deloitte carried out such work or made such enquiries, there would have been any material effect on the Report. Further, Deloitte has no obligation to notify you if any matters come to its attention which might affect the continuing validity of the comments or conclusions in the Report.

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This notice shall be governed and construed in accordance with the laws of Ireland. The courts of Ireland will have exclusive jurisdiction to settle any claim, dispute or difference which may arise out of or in connection with this notice.

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1. Introduction

1.1 Background

The Single Electricity Market ("SEM") was developed by the Commission for Energy Regulation ("The Commission" or "CER") and the Utility Regulator for Northern Ireland ("UR"), together the Regulatory Authorities ("RAs"). The Single Electricity Market Operator ("SEMO") is responsible for the operation of the SEM. The Trading and Settlement Code ("TSC" or "the Code") was developed as part of the process of establishing the SEM and constitutes the trading and settlement arrangements for the SEM. The Code was designated on 3 July 2007 and since then has been subject to Modification via the processes set out therein.

The Regulatory Authorities have engaged Deloitte as SEM Market Auditor to undertake a Market Audit of the SEM as required under the Code. The requirement for a Market Audit is set out in section 2 of the Code in paragraphs 2.131 to 2.143. Specifically

- The Market Auditor is appointed by the Regulatory Authorities;
- The Market Auditor shall conduct an audit of the Code, its operation and implementation and the operations, trading arrangements, procedures and processes under the Code at least once a year; and
- The Regulatory Authorities shall consult with Parties on the terms of reference for the audit, and specify and publish annually the precise terms of reference for the Market Audit.

The scope of the Market Audit is set out in the "Terms of Reference for the Market Audit SEM-16-033" published on 29 June 2016 (the "Terms of Reference") in accordance with paragraph 2.136 of the SEM TSC. The scope of the Market Audit for the period of 1 January 2016 to 31 December 2016 of operation of the market focuses on SEMO compliance with the relevant aspects of the Code and its Agreed Procedures. The scope for SEMO excludes activities undertaken by the Transmission System Operators ("TSOs"), Meter Data Providers and other participants as set out in the TSC and Agreed Procedures. The scope also excludes the operation of certain components of the MSP Pricing Engine covering the operation of the Unit Commitment, Economic Dispatch and calculation of Shadow Prices.

The scope established an expansion to include follow-up on Agreed upon Procedures (AuP) findings from previous years' audits. The 2010, 2011, 2013 and 2015 Market Audits included a review of certain activities of MDPs and SOs in relation to meter data for generation, interval and non-interval metering, and dispatch instructions on an AUP basis. The results of this follow-up activity are presented in Appendix A to this Report.

The terms of our services in which we act as Market Auditor and the respective areas of responsibility of the Regulatory Authorities, SEMO, other parties and ourselves are set out in our engagement letter to the Regulatory Authorities.

Unless otherwise specified, words and expressions used in this Report have the same meaning as defined in the Code.

1. Introduction (Continued)

1.2 Requirement for Market Audit

The requirement for a Market Audit of the Code is set out in section 2 of the Code in paragraphs 2.131 to 2.143. As specified in the Terms of Reference it covers the 12 months from 1 January 2016 to 31 December 2016, including resettlement of previous settlement dates performed within this period.

The Terms of Reference also required that the Market Auditor perform interim audit procedures to cover the first six months of the audit period. Significant Issues and Other Matters noted during the course of our interim and final audit procedures are included in Sections 3 and 4 of this Report; in some cases these issues had been resolved prior to 31 December 2016.

1.3 Report Structure

Section 2 contains our Market Audit Opinion. The Market Audit Scope was agreed by the Regulatory Authorities in accordance with the Terms of Reference.

It has been agreed with the Regulatory Authorities that materiality should be expressed based on an appropriate percentage level of the estimated annual market value of energy traded in the All-Island Market. The percentage level has been set at 0.25% of estimated annual market value of energy traded in the All-Island Market. Planning materiality for the Market Audit has therefore been set at €3.6m (prior period €4.44m) and it will be for Parties to the Code themselves to evaluate the financial impact of any errors or matters arising on their own businesses.

Section 3 contains our Report of Significant Issues, setting out matters identified during the course of the audit which, while not material in the context of the audit and not resulting in a qualified Audit Opinion, may have a significant impact on Parties to the Code. Where, in our judgement, matters arising may be significant to individual parties such matters have been included in the Significant Issues Report with sufficient detail so as to allow the Regulatory Authorities and Parties to the Code to evaluate the impact of the cause and circumstances of matters reported. Qualitative and quantitative factors were taken into account when determining the significance of an issue. From a quantitative perspective, in line with the prior period, a threshold of one tenth of the annual materiality value has been applied as a general guideline in determining whether a matter should be included in the Significant Issues Report. The resolution response for each of these points was provided by SEMO, other than where specifically noted.

Section 4 contains details of Other Matters Arising which we wish to bring to the attention of the market. They do not represent issues of significant noncompliance and accordingly there is no requirement to report these matters under the terms of the Terms of Reference. However, we include this section as we believe it may assist the Regulatory Authorities and Parties to the Code to judge for themselves the relative significance of all points reported.

Section 5 contains the Follow up on Prior Period Issues, which were brought to your attention in the prior period SEM Independent Market Auditor's Report, some of which have been resolved and where the points have not yet been resolved they have been referenced into sections 3 and 4 with a current year update.

1. Introduction (Continued)

1.4 Market Operator Monthly Reporting

SEMO is obliged under Clause 2.144 of the Code to issue a Market Operator Monthly Report to the Regulatory Authorities on the performance of SEMO and Parties to the Code. The Monthly Report includes details of the type and status of all Code breaches identified by SEMO and whether the breaches represent deadlines that have not been met, system faults or errors, and whether these breaches have been resolved or remain outstanding at the end of each month. The Market Operator Monthly Reports are available on the SEMO website.

SEMO is required to perform a materiality assessment, using set criteria which are described in the Monthly Reports. The materiality threshold applied is significantly lower than materiality defined for Market Audit purposes.

While the breaches reported in the Monthly Reports represent noncompliance with the Code, we have not repeated in this document those which are below the audit materiality threshold.

2. Market Auditor Opinion

Independent Market Auditor's Assurance Report to the Commission for Energy Regulation ("The Commission" or "CER") and the Utility Regulator of Northern Ireland ("UR") (together "The Regulatory Authorities")

We have performed assurance work over the extent to which the Single Electricity Market Operator ("SEMO") has complied with the Trading and Settlement Code ("Code") and relevant Agreed Procedures as defined in the "Terms of Reference for the 2016 Market Audit" published by the Regulatory Authorities on 29 June 2016 during the 12 month period ended 31 December 2016.

This report is made solely for the Regulatory Authorities, as a body, in accordance with paragraph 2.133 of the Code. Our work has been undertaken so that we might state to the Regulatory Authorities those matters we are required to state to them in an auditor's report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the Regulatory Authorities and the Parties as a body, for our work, for this report, or for the opinions we have formed. Parties to the Code may only rely on this report if they have agreed in writing to be bound by the conditions under which it has been prepared, in line with the engagement letter.

Unless otherwise specified, words and expressions used in this report have the same meaning as defined in the Trading & Settlement Code.

Responsibilities of the Single Electricity Market Operator, Regulatory Authorities and Parties to the Code (together the "Responsible Party")

The Trading & Settlement Code is a legal agreement which, inter alia, sets out the terms of the trading and settlement arrangements for the sale and purchase of wholesale electricity on the island of Ireland between participating generators and suppliers ("Single Electricity Market"). The Code defines the Rules and Agreed Procedures which are required to be followed by the signatories to the Code ("Parties") who are bound by its provisions.

The functions of the Regulatory Authorities are set out in the Electricity Regulation Act 1999, the Northern Ireland (Miscellaneous Provisions) Act 2006 and in the Code. In the context of the Market Audit the role of the Regulatory Authorities as the Responsible Party is to appoint the Market Auditor and agree the terms of the Market Auditor's appointment, consult on and issue the Terms of Reference for the Market Audit, and receive Market Audit Reports.

SEMO is responsible for the operation of the Single Electricity Market ("SEM") under the Code as set out in paragraphs 2.117 to 2.125 therein and for complying with the requirements of the Code and Agreed Procedures as listed in appendix d to the Code, insofar as they are applicable to SEMO.

The responsibilities of the Parties in respect of the Market Audit are set out in paragraph 2.139 of the Code, which requires parties to provide without charge to the Market Auditor in a timely manner, subject to any obligations of confidentiality, such information as is reasonably required by the Market Auditor to enable the Market Auditor to comply with the functions and obligations and Terms of Reference for the purposes of conducting the audit and preparing and finalising the Audit Report. A person may only become a Party to the Code in accordance with the terms of the Code and the Framework Agreement.

2. Market Auditor Opinion (Continued)

Responsibilities of the Market Auditor

The requirements for the Market Audit are set out in paragraphs 2.131 to 2.143 of the Code, in particular paragraph 2.133 of the Code which sets out that “the Market Auditor shall conduct an audit of the Code, its operation and implementation and the operations, trading arrangements, procedures and processes under the Code”. It is our responsibility as Market Auditor to execute the Market Audit as required under the Code and as set out in the Terms of Reference for the 2016 Market Audit. In the context of this engagement the terms ‘Audit’ and ‘Market Audit’ mean a reasonable assurance engagement performed in accordance with the International Standard on Assurance Engagements 3000 (Revised) “Assurance Engagements Other Than Audits or Reviews of Historical Financial Information”.

The Terms of Reference for the 2016 Market Audit expressly excludes operation of certain components of the MSP Pricing Engine from the scope of the Market Audit. The excluded components are the operation of Unit Commitment, Economic Dispatch and calculation of Shadow Prices. However, the scope includes certain procedures over the SEMO decision process and approvals for the use of the Mixed Integer Programming (“MIP”) solver in place of Lagrangian Relaxation (“LR”).

The following functions performed by the Regulatory Authorities, Data Providers and other Parties or their agents under the Trading & Settlement Code are also excluded from the scope of the Market Audit including, inter alia:

- Generation metering;
- Dispatch instruction logging;
- Metering and aggregation of eligible and profiled customer demand;
- Provision by Parties of Technical and Commercial Offer Data;
- Loss adjustment factors, generator unit technical characteristics and other data provided by Transmission System Operators / Distribution System Operators; and
- Settlement, capacity and other parameters provided by the Regulatory Authorities.

We draw attention to the Market Operator Monthly Reports which list all Code breaches identified by SEMO. Other than where the impact of the issue exceeds the audit materiality threshold, we do not repeat the list of breaches in this document. The Market Operator Monthly Reports are issued by SEMO and are available on its website.

2. Market Auditor Opinion (Continued)

Basis of assurance opinion

We conducted our assurance work in accordance with the International Standard on Assurance Engagements 3000 (Revised) "Assurance Engagements Other Than Audits or Reviews of Historical Financial Information". That standard requires that we plan and perform our work to obtain appropriate evidence about the subject matter of the engagement sufficient to support an opinion providing reasonable assurance when evaluated against the identified criteria. In the context of the Market Audit the subject matter consists of relevant activities of SEMO which are evaluated against the relevant paragraphs of the Code and applicable Agreed Procedures as set out in the Terms of Reference for the 2016 Market Audit.

Our assurance work includes examination, on a test basis, of evidence relevant to the Code and Agreed Procedures including the review of risks, control objectives and controls associated with SEMO's performance of their duties and operation of the settlement arrangements. Our testing of the controls comprised review of documentation, corroborative enquiry with key SEMO staff and, on a sample basis, testing the operation of controls and the validity and accuracy of the calculations underlying settlement output.

We planned and performed our assurance work so as to obtain all the information and explanations which we considered necessary in order to provide us with sufficient evidence to give reasonable assurance that SEMO have complied with the Code and relevant Agreed Procedures as defined in the Terms of Reference for the 2016 Market Audit.

We comply with the independence and other ethical requirements of the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants, or equivalent code, which is founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour.

We apply International Standard on Quality Control 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.

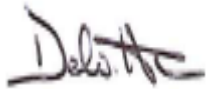
For the purpose of our opinion a qualification, in terms of material non-compliance with the Rules and relevant Agreed Procedures of the Code, would arise if we considered the breach to be of such significance that it undermined the robust operation of the settlements process.

We have prepared a Report of Significant Issues which is attached to this opinion setting out matters identified during the course of the audit which, while not material in the context of the audit, may have a significant impact for Parties to the Code. Our opinion should be read in conjunction with the Report of Significant Issues, but is not qualified in respect of matters contained therein.

2. Market Auditor Opinion (Continued)

Opinion

On the basis set out above and subject to the exclusions noted in the Responsibilities of the Market Auditor section above, in our opinion, during the period from 1 January 2016 to 31 December 2016 the Single Electricity Market Operator ("SEMO") has, in all material respects, complied with the Code and relevant Agreed Procedures as set out in the "Terms of Reference for the 2016 Market Audit" published by the Regulatory Authorities on 29 June 2016.

A handwritten signature in black ink, appearing to read "Deloitte", is positioned above the printed name of the firm.

Deloitte
Chartered Accountants
Dublin
Ireland

Date: 3 April 2017

3. Report of Significant Issues

No significant issues identified.

4. Other Matters Arising

Issue	Effect	SEMO Response
1. Netting Generator Unit Registration		
<p>Per paragraph 2.62 of the T&SC the Market Operator is required to register a single Netting Generator Unit (NGU) for each Trading Site registered by a Participant.</p> <p>As part of our testing we identified a trading site was present in the market without an associated NGU. Further investigation identified that the NGU associated with the Trading Site had been de-registered when one of the two generator units associated with the trading site was de-registered in August 2015, however as a second generator unit remained registered to the Trading Site the NGU should not have been de-registered.</p> <p>The internal SEMO checklist relating to de-registration of generator units includes the step to de-register the associated NGU, but does not identify the requirement that this should only be performed when all generator units for a Trading Site are to be de-registered.</p>	<p>The NGU is settled on the basis of the eligible netting quantity (ENQ) as defined in paragraph 4.83. From this it can be seen that for trading periods when the active generator unit associated with the site has been dispatched and has non-zero meter generation and the trading site supplier unit has non-zero metered demand then the ENQ will be non-zero and hence the NGU should have been included in settlement. For such periods the participant should have received a net reduction in energy and capacity payments and hence has currently received over-settlement.</p> <p>Analysis of the affected units by SEMO has confirmed that the number of affected periods is less than 100, with an estimate impact of less than €1,000.</p>	<p>SEMO accept that the Netting Generator Unit in question was de-registered in error.</p> <p>SEMO are in the process of re-registering the affected unit in order to correct the issue going forward. The business process which resulted in this error has been updated to ensure that it does not recur.</p> <p>SEMO do not intend to pursue resettlement of the affected period due to the fact that the cost of this exercise (both for SEMO and the wider market) would be significantly greater than the impact of the issue itself.</p>
2. Treatment of Dispatch Instructions with same Instruction Time and Type		
<p>We identified a difference in the derivation of MSQ for a VPTG unit in one of our testing dates whereby SEMO had treated the unit as constrained but our modelling had identified the unit as unconstrained.</p> <p>Further investigation identified the root cause as the unit receiving two dispatch instructions – one imposing the constraint and one lifting the constraint – with the same effective and issue timestamps.</p>	<p>The unit was treated as constrained and hence dispatch quantity, availability profile and market schedule quantity were all set on the basis of table 5.1 for a constrained unit rather than being set to actual output. It was confirmed through review of additional dispatch instructions that the issue applied for a four day period, with an estimate over settlement in the favour of the participant estimated at less than €4,000.</p>	<p>SEMO have contacted EirGrid Transmission System Operator (TSO), as provider of the affected Dispatch Instructions (DIs), to request clarification of intended instruction set and dispatch status.</p> <p>The TSO have confirmed that the intended dispatch status was to remove the constraint. As such, the treatment of this period of dispatch as constrained within Initial Settlement was incorrect. The TSO has</p>

Issue	Effect	SEMO Response
<p>Paragraph O.11 from Appendix O of the T&SC outlines the rules for treatment of dispatch instructions with the same instruction time, however it does not distinguish between two wind instructions made with the same issue and effective timestamp. This was a previously identified issue by SEMO who had confirmed that in this case the system behaves unpredictably in applying the ordering rules. In this case it resulted in the constraint instruction being applied second and hence the unit treated as constrained.</p>		<p>also confirmed that the submitted DIs were incorrect and that they are investigating the cause.</p> <p>SEMO will liaise with EirGrid TSO to ensure that this issue is corrected via submission of a Formal Query and subsequent resettlement.</p>
<p>3. Calculation of Ex-Post Capacity Weighting Factor</p>		
<p>A difference was observed in the calculation of the ex-post capacity weighting factor for M+13 resettlement for September 2015.</p> <p>Further investigation identified that the step to update the denominator of the calculation following the update of Availability Profile for some units to correct a defect had not been run resulting in the calculation using updated loss of load probability for the numerator but the previously calculated denominator.</p>	<p>A difference of approximately 0.17% was noted on all dates for September 2015, which causes a different allocation of capacity payments across trading periods. The net impact on individual participants was quantified as less than 0.01% or less than €20 per unit.</p>	<p>SEMO accept that the aggregated Loss of Load Probability denominator was incorrect for the affected Capacity Period. SEMO have updated the process which resulted in this error to ensure that it does not recur.</p> <p>SEMO do not intend to pursue resettlement of this issue due to the fact that the cost of this exercise (both for SEMO and the wider market) would be significantly greater than the impact of the issue itself.</p>
<p>4. Erroneous Supply Unit Deregistration</p>		
<p>We identified that meter data for one Supply Unit for initial settlement for October 2016 had not been processed for the unit.</p> <p>Enquiry with SEMO confirmed that this was an issue that had previously been identified by SEMO. The omission of the unit had resulted from a defect in the settlement system where a change in parameters for a Trading Site incorrectly end-dated the Associated</p>	<p>The affected unit will not have been charged for settlement charges including energy payment for all initial settlement occurring after the incorrect deregistration of the unit. In addition any resettlement which took place following the incorrect deregistration and which applied for the period following the incorrect de-registration date will also have</p>	<p>SEMO sought clarification from our vendor on this matter. Our vendor confirmed this was a defect.</p> <p>SEMO continue to liaise with our vendor on a fix. Once the fix has been applied this issue will be corrected via scheduled M+4 and M+13 resettlement.</p>

Issue	Effect	SEMO Response
<p>Supply Unit previously associated with that Trading Site, and had back dated this to the point at which the Supply Unit had been removed from the Trading Site. As a result the Supply Unit was not recorded as registered in the system and hence metering data was not loaded for settlement purposes.</p>	<p>resulted in the refund of previously paid settlement charges.</p> <p>As noted SEMO had identified this issue and are in the process of resolving the underlying error in the registration data in order for the issue to be corrected in M+4 / M+13 resettlement.</p>	
<p>5. Organising Unit Registration Meeting</p>		
<p>A unit registration meeting must be organised within one working day of completion of the review and validation process for the purposes of identification of a possible Meter Data Export Date and propose an Effective Date.</p> <p>For the selected samples, we were provided with the dates the unit registration meetings were held. However SEMO has not tracked the dates when the review and valuation process has been completed.</p>	<p>Compliance with the Agreed Procedure requirements could not be confirmed as the completion dates were not tracked.</p>	<p>In prior period(s) the registration team have found themselves dealing with an unprecedented level of traffic coming through their department. Due to this they have begun to prioritise the unit meeting depending both on the availability of all parties (TSO, MDP and SEMO) and on the urgency of the registration (that is, the order in which the units are expected to go effective).</p>
<p>6. Initial Credit Cover Requirement</p>		
<p>Initial Credit Cover Requirement (ICCR) must be issued within two working days of the generation of participant ID, Account ID and Unit ID and issuing of these to the applicant.</p> <p>ICCR was not issued within the timeline of two working days for five applicants, with a delay of 21 working days for one applicant and delays of one working day for the other exceptions.</p>	<p>The delays in issuing the ICCR represents non-compliance with the relevant Agreed Procedure requirement.</p>	<p>In the case of the ICCR with a delay of 21 working days, there were number of emails exchanged between SEMO Registration and the applicant regarding the Form of Authority, Participation Notice, and associated Supplier ID before the initial meeting was held and ICCR calculated and issued.</p> <p>The unit did not go effective in SEM until a later date and there was no generation and therefore no settlement in the period.</p>

Issue	Effect	SEMO Response
7. Accession Deed to be sent by registered post		
<p>The Market Operator is required to sign and date the accession deed and sends a copy of it to the applicant through registered post.</p> <p>For one applicant whose accession deed was signed on 8 August 2016, the registered post documentation for the accession deed was not available.</p>	<p>This represents non-compliance with the relevant Agreed Procedure requirement.</p>	<p>This applicant is based in Germany and the posting department at SEMO did not accurately track the accession deed as it was sent outside of Ireland and the UK.</p>
8. System and Application Access Control		
<p>The following matters were identified where management controls over systems and application access were not in line with good practice:</p> <ol style="list-style-type: none"> 1) One user who changed roles was identified with access privileges to the market database which were no longer required. In addition, a formal user access review of the access privileges at the database level was not completed in the year. 2) User activity reports to market systems were not run in the year. 3) While a monthly server room access list review is in place, in some instances management do not sign off on the access lists as evidence of their review. 	<p>This represents deviation from good practice to meet the requirements of Agreed Procedure 5, which require that the access to market systems is restricted according to users' level of authority and access requirements.</p> <ul style="list-style-type: none"> • 2.2.5 System and Application Access Control • 2.2.6 Monitoring System Access • 2.3.8 Physical and Environmental Security 	<ol style="list-style-type: none"> 1) We accept the audit finding. Going forward, the DBAs will be included in the Starters, Movers, Leavers process that is currently managed by Employee Services. Once the DBAs have been informed of any movers or leavers they can take the necessary steps relating to account maintenance. 2) We accept the audit finding. A formal process document will be created by IS Infrastructure for the running, review and actioning of user activity reports. 3) We accept the audit finding. A formal approval / review process will be created by IS Infrastructure.

Issue	Effect	SEMO Response
9. Variable Market Operator Charge		
<p>Paragraph 6.151 of the TSC requires that the variable market operator charge for supplier units be charged on the basis of total net settlement net demand (SND) for all supplier units registered for a participant over the billing period, but that no charge is applied when the net SND is negative (i.e. there is net export from the supply units for the billing period). The settlement systems do not currently apply the requirement that no charge is applied when there is negative demand.</p>	<p>Participants which are net exporters and have net negative demand for their supplier units over the billing period currently receive a payment in respect of the variable market operator charge which is in contravention of the Code. Over the course of 2016 this was estimated to amount to €45,000-50,000.</p>	<p>SEMO accept that the system implementation is not consistent with the Trading and Settlement Code. An impact assessment was carried out in 2016. SEMO considered the options proposed, the potential impacts of each option on both the Market Operator and market Participants and the costs associated. SEMO also liaised with Regulatory Authorities at the time. Taking everything into consideration, the costs outweighed the benefit of fixing the issue for the lifespan of the SEM. SEMO will continue to liaise with the Regulators Authorities and to monitor the materiality of the issue. SEMO will revisit this decision should it increase significantly.</p>

5. Follow up on Prior Period Issues

Prior Period Issue	Update	2016 Classification	Previous Classification
1. Error in calculation of Billing Period currency cost	This issue has been resolved via M+4 resettlement as planned. The underlying system defect was resolved prior to publication of the 2015 Market Audit Report.	Closed	2015: Other
2. Approach to Testing of Market System Changes	<p>The testing strategy of Market System changes remained unchanged from previous year, which was commended by SEMO in 2015.</p> <p>The regression testing approach used during the testing of defects was adopted to the specific scenarios tested, and included areas that could potentially have negative impact from the defect fixes.</p> <p>SEMO ceased the bi-annual release schedule after the Release 2.8.0 implemented in June 2016. SEMO will continue to provide maintenance of Market System until I-SEM goes live. The Market System maintenance includes fixes to defects, technical updates and archival of data.</p>	Closed	2015: Other
3. Calculation of Dispatch Quantity for Variable Price Taker Units	The defect was corrected as part of a wash-up release in September 2016. Correction of individual dates requires the submission of settlement queries by the affected participants.	Closed	2015: Other
4. Calculation of Dispatch Quantity with missing loading / de-loading rates	The specific unit affected has now submitted updated technical offer details to include the missing loading / de-loading rates. Changes have been agreed with the TSO regarding the operational submission of TOD with missing details and a review of all units performed to identify any other similar issues.	Closed	2015: Other
5. Data Publication Discrepancy	As noted in the 2015 Market Audit report no specific system change was planned in light of I_SEM.	Closed	2015: Other
6. Failure Of A Meter Data Provider Type 3 Channel	<p>The instances tested during the audit apply to where there was an issue with submissions from one single Meter Data Provider (i.e. there was not a general issue with the interface affecting all MDPs) – also, in each case these were relevant to MDPs internal to the EirGrid Group (i.e. EirGrid & SONI). In addition these submission issues did not impact operational timelines under the Code, nor were other SEM stakeholders affected.</p> <p>The Modification Committee confirmed that the AP Notification for Mod_09_15 AP07 Amendment to Update Process re Submission Failure was approved.</p> <p>The failure form is no longer required.</p>	Closed	2015: Other
7. Registered Bank Charge	The modification was approved and deemed effective from 9 th September 2016. This has been verified on SEMO website.	Closed	2015: Other

Appendix A – Follow-up on Prior Year Agreed Upon Procedures Exceptions for Transmission System Operators and Meter Data Providers

A.1 Scope and Approach

The 2010, 2011, 2013 and 2015 Market Audits included a review of certain activities of MDPs and TSOs in relation to meter data for generation, interval and non-interval metering, and dispatch instructions on an Agreed upon Procedures (AUP) basis. This work identified a number of findings and the 2016 SEM Market Audit Scope approved by the Regulatory Authorities included follow-up enquiries on these findings.

As agreed with the Regulatory Authorities we performed the follow-up through interviews with relevant staff from each TSO and MDP and performed walkthrough testing of any new processes and controls implemented. The follow-up visits were performed between 9 February 2017 and 27 February 2017. Given the timeframes since the original work in some cases processes and systems had significantly changed from those in scope at the time of our original testing. In such cases we sought to understand whether the current processes and controls in place addressed the underlying exception previously identified rather than focusing on specific actions taken just as a result of the previous work.

For each exception noted in the previous Agreed Upon Procedure reports we executed the following procedures:

- Enquired of management regarding any specific changes made to existing systems, processes and controls in response to the point raised;
- Enquired of management as to how any relevant new systems, processes and controls addressed or mitigated the points raised;
- Performed a walkthrough test (i.e. for a single transaction / example of control operation) to confirm that the updated or new process operated as described by management.

A.2 Basis of Reporting

The AUPs performed in the previous years where one or more exceptions were identified are outlined in the table below. For each exception we have included the results of our follow-up activities. As noted in our previous reports, the term “exception” when applied to this work relates to exceptions compared to the AUPs which may or may not represent non-compliance with the Code.

The scope of our work in preparing the update below was limited solely to performing follow-up work (following the approach described above) on the specific exceptions noted. Accordingly we do not express any opinion or overall conclusion on the procedures we have performed. The RAs are responsible for determining whether the scope of our work specified is sufficient for their purposes and we make no representation regarding the sufficiency of these procedures for their purposes. If we were to perform additional procedures, other matters might come to our attention that would be reported to the RAs.

Our Report should not be taken to supplant any other enquiries and procedures that may be necessary to satisfy the requirements of the recipients of the Report.

Appendix A – Follow-up on Prior Year Agreed Upon Procedures Exceptions for TSOs and MDPs (Continued)

The procedures we performed did not constitute a review or an audit of any kind. We did not subject the information contained in our Report or given to us by the participants to checking or verification procedures except to the extent expressly stated within the procedures. This is normal practice when carrying out such limited scope procedures, but contrasts significantly with, for example, an audit. The procedures we performed were not designed to and are not likely to reveal fraud.

The findings arising from our follow-up activity have been shared with the respective TSO / MDP who have confirmed their factual accuracy. Where exceptions or comments were noted, each TSO / MDP has provided a response including details of any action to be taken in respect of the matters raised, which has been provided to the RAs.

Appendix A – Follow-up on Prior Year Agreed Upon Procedures Exceptions for TSOs and MDPs (Continued)

Year	Original Procedure Title	Original Procedure Description	Original Exceptions / Comments	Results of Follow-up
2010	1. Registration and meter technical details ("MTD") for new units are accurately processed and configured.	<ul style="list-style-type: none"> Document process performed to record registration and MTD within relevant SO/MDP systems (including register mapping, correct configuration of main/sub meter etc). Confirm review and approval process. Obtain a listing of new unit registrations from SO/MDP. Reconcile listing to new unit registrations provided by SEMO. For a sample of 2 new unit registrations obtain evidence that registration and confirmation of MTDs was reviewed and approved in line with the above process. Confirm that loss adjustment factors have been calculated in line with the normal process and subject to review and approval by the relevant SO. 	<p>All registrations within the samples tested were recorded accurately. For one sample item there was no documentary evidence that a review of the MTD had been carried out.</p> <p>No errors were identified in the calculation of Loss Adjustment Factors (DLAF, TLAF and CLAF). However, for one of the Registrations selected, there was no documented evidence that there was a review of the LAFs. It was noted that this approval process was initiated during the course of the year and that the other sample item at the particular entity was reviewed and appropriate sign-off recorded.</p>	<p>Since the original work performed the systems and processes at the affected MDP have been updated as part of a systems replacement process. MTD are recorded in the system as part of generating the associated work order and the actual MTD of the installation are recorded by the technician when completing the installation job via a handheld device. This automatically interfaces the details back to the MDP's system where all details are validated against the work order requirements and the details held for the meter which were captured at the time of booking the meter into stores. Any discrepancies must be resolved before the work order can be completed. We performed a walkthrough of this process for a new generation metering connection.</p> <p>The affected TSO has implemented a documented process for the calculation of TLAFs and CLAFs, which incorporates formal review and approval steps. We performed walkthrough testing to confirm this process had operated for the 16/17 TLAF data without exception.</p>
2010	2. Registration data is consistent between SO/MDP and SEMO.	<ul style="list-style-type: none"> Document process performed to review and validate registration data provided by SEMO as part of unit registration, including review and approval requirements. For a sample of 2 new unit registrations obtain evidence that data was validated and this validation was reviewed and approved as required. 	<p>Meter technical data is examined by each entity as they take an active approach in the validation of each meter before the registration process.</p> <p>However there was no documentary evidence in any of the entities where testing was performed to demonstrate that this checking was reviewed and validated by management.</p>	<p>One TSO has implemented a checklist to ensure all internal processes have been completed appropriately regarding meter details for new registrations. This check does not involve validation of external data as this is carried out by the DSO acting as Meter Operator.</p> <p>One TSO performed validation of Meter technical details as part of the commissioning process. This includes validation during on-site commissioning, approval of which is captured on a standard Metering Maintenance Record. In addition the</p>

Year	Original Procedure Title	Original Procedure Description	Original Exceptions / Comments	Results of Follow-up
				<p>participant is required to validate and approve data from a 10 day meter testing period after the SEM registered Generation unit first meter data export date prior to the unit being made live in the market. We performed a walkthrough of the maintenance records and testing signoff for a new unit without exception.</p> <p>See also previous procedure in relation to the affected MDP.</p>
2010	3. Meter equipment for new registrations meets accuracy and other technical requirements of the market.	<ul style="list-style-type: none"> Confirm that testing/certification process is in place for new meter connections For a sample of 2 new unit registrations obtain approvals, proving test certificates or other evidence to confirm meters were assessed as required. Where exceptions/deviations noted during testing obtain evidence to confirm these were resolved prior to unit go-live within the market, or were communicated to SEMO as required. 	While no errors were identified for the sample tested, it was observed at one of the entities that no meter testing certificates were issued.	Individual meter test certificates are only required for generation meters, which is managed by the TSO. All meters for which the MDP is responsible must certified to meet the relevant code requirements, with testing performed by the Meter Testing team. The Meter Testing team processes are ISO Accredited.
2010	5. Meter reading data is complete.	<ul style="list-style-type: none"> Confirm configured exception categories/criteria within meter reading system, e.g. comparison of actual vs. expected data, matching of actual vs. expected source, data received from de-energised/sealed meter, communication system failure. For a sample of 10 exceptions reported confirm appropriate action taken, including review and approval where relevant. 	No specific errors were identified in the data as part of our review. However, for 3 of the 4 entities whilst we observed a review of daily exception reports there was no evidence of a process to perform and document a secondary or QA review to assess the actions taken by the primary reviewer and the consistency over time and different personnel of such actions.	<p>One entity has produced documented procedures for the processing of both interval and non-interval meter reading exceptions. A daily log is used to track closure of each exception. Although there is no QA of individual exceptions an additional validation check is run prior to the use of meter reads in billing/aggregation processes to identify very high consumption/usage factors which is intended to catch any materially erroneous data including that arising from incorrect exception clearance.</p> <p>These processes were subject of internal audits in 2014 and 2016 and copies of these Internal Audit reports were obtained. In response to these audits, a full review of processes was carried out internally in 2016 which included sample based checking of process compliance although the sample references were not documented. Processes were</p>

Year	Original Procedure Title	Original Procedure Description	Original Exceptions / Comments	Results of Follow-up
				<p>updated to reflect the results of this process review.</p> <p>One entity has configured their system such that clearance of each individual exception prompts the user to record a comment regarding the exception clearance which is recorded along with the username and timestamp of the action. We performed a walkthrough of the process without exception.</p> <p>We were informed management review is conducted on periodic basis by the team leader by reviewing historic exception clearance whilst also performing holiday cover. This represents a change from the previous 'spot check' approach as management determined that this approach gave a fuller picture of the performance of each individual due to reviewing a wider range of actions. No documentation is produced from this activity and hence no walkthrough to confirm process operation was possible.</p> <p>For one entity daily review of metering exceptions is captured as part of the daily operator log, completion of which is subject to periodic management quality assurance. In addition restricted roles are used within the meter read management software to restrict the ability to users to reprocessing meter read data only (including application of validation and substitution rules), i.e. individual meter read values cannot be overwritten except by authorised team leaders.</p>
2010	6. Metering data provided to SEMO is accurate.	<ul style="list-style-type: none"> Confirm configured exception criteria relating to meter reading data, e.g. missing periods, checksum errors, clock errors, meter alarms and warnings, etc. For a sample of 15 exceptions reported confirm appropriate action taken, including review and approval where relevant. 	<p>No specific errors were identified in the data as part of our review.</p> <p>However, for 3 of the 4 entities whilst we observed a review of daily exception reports there was no evidence of a process to perform and document a secondary or QA review to assess the actions taken by the</p>	<p>For details of the meter validation process and associated QA see procedure 5 above.</p> <p>In respect of Tolerance Limits two entities have formal, documented processes for the treatment of exceptions where tolerance limits are applied including guidance on when such limits should be changed. One of these entities has also restricted the ability to change tolerance limits to team</p>

Year	Original Procedure Title	Original Procedure Description	Original Exceptions / Comments	Results of Follow-up
		<ul style="list-style-type: none"> • Confirm process in place to validate meter readings/pulse data obtained, including main/check meter comparison, tolerances and energy limits, automated and manual meter advance reconciliation. • For a sample of 5 generator units on individual days walk through meter data obtained and confirm validation processes appropriately applied. • For a sample of 5 changes in metered generation data provided to SEMO following initial settlement for 2010 sample testing dates ascertain the reason for the change in metered generation and the validity of this change. 	<p>primary reviewer and the consistency over time and different personnel of such actions.</p> <p>We also observed that there is no defined procedure in place within two of the entities for the acceptance of meter information that exceeds the higher tolerance limit. It was noted on several occasions for three of the four entities that tolerance limits were increased on the receipt of meter data that exceeded the limit, but this was not subject to independent review and approval.</p> <p>There was one item within our sample where meter accuracy checks did not highlight an exception that occurred, and the data was sent to SEMO where it was flagged as suspect. The entity at which this exception was noted has subsequently implemented an additional check to detect similar exceptions.</p>	<p>leaders and hence such changes must be approved prior to the proposed change. We performed a walkthrough of the process at both entities without exception.</p> <p>For the third entity an established but undocumented procedure is in place for the treatment of exceptions where tolerance limits are applied. Any change in tolerance limits results in capture of a comment, username and timestamp in the same way as when clearing a reading exception.</p> <p>The TSO referred to in the final paragraph has implemented a daily system check for metering data using custom exception reports. IT systems now require exceptions to be cleared before data is passed to SEMO.</p>
2010	9. The ongoing accuracy of metering equipment is assessed and appropriate steps taken where exceptions are identified.	<ul style="list-style-type: none"> • Confirm process in place to comply with annual inspection requirements. • Confirm process in place to identify meters requiring ad-hoc testing. • For a sample of annual and ad-hoc inspections/tests required obtain test reports/certificates to confirm performed as required. • Where exceptions identified (in this sample) confirm appropriate action taken to revise metered generation provided to SEMO. 	<p>There were no exceptions identified in the sample tested. However at one entity it was observed that the paperwork for one meter test took 6 weeks to be returned for completion of the process.</p>	<p>All meter tests are managed as Work Orders. A monitoring report is used to track jobs that have been completed but where paperwork has not been received and aged items are followed up on a weekly basis. We inspected the report from January 2017. Seven of the ten outstanding items was noted to be over six weeks old, in all cases these work orders were then closed within January 2017.</p>
2010	10. Queries are resolved in a timely manner.	<ul style="list-style-type: none"> • For a sample of 5 data queries, 5 settlement queries and 1 dispute review timeline for investigation and provision 	<p>It was observed that there is no checklist in place to ensure that the queries are responded to in the correct</p>	<p>All four entities noted that the volume of queries received is low (<10 per annum per entity).</p>

Year	Original Procedure Title	Original Procedure Description	Original Exceptions / Comments	Results of Follow-up
		of relevant information/updated settlement data.	timelines outlined by SEMO. This can lead to the deadlines being missed by an SO/MDP.	<p>One entity captures and tracks all queries through a central log used by the team responsible for managing queries. This includes capturing relevant data from SEMO including the query resolution. Completion of all queries within the required timescales is captured as a KPI and reported to management on a monthly basis. We performed a walkthrough of the query logging and response process and confirmed that the KPI has been achieved for the month of December 2016.</p> <p>Two entities maintain a log of all queries (including those raised by the TSO/MDP and those where the query is received from SEMO) however do not have a formal process in place to monitor the compliance with response SLAs.</p> <p>One entity has made no significant change in the process for managing queries. Walkthrough of two example queries was performed, in one case the query had exceeded the required timelines although we note that the query was being actively investigated by the MDP and SEMO during this period. There is no formal reporting of the status of the query or the associated timelines.</p>
2010	11. Root causes of queries and disputes are identified and action taken to reduce the risk of recurrence.	<ul style="list-style-type: none"> Through enquiry obtain understanding of underlying root cause of each query/dispute discussed as part of item 10 above and ascertain what action taken to reduce risk of recurrence. 	At two of the entities there is no communication with SEMO that the query has been upheld, this means that SO/MDP is unaware of the final root cause of the issue which hinders them taking steps to improve relevant processes to prevent recurrence.	As noted above information including query resolution is captured as part of the query management process for the two entities. One entity has an informal process that for all queries received investigation will be performed of the underlying root cause and where necessary an additional query will be raised to correct data for other units/trading periods impacted by the same underlying issue.
2010	12. Dispatch instructions provided to SEMO are complete and accurate, including taking into account real-time events.	<ul style="list-style-type: none"> Identify and walkthrough quality control processes in place to review dispatch instructions ("DI") including controls relating to completeness and accuracy. 	While it was observed that a review is performed of Dispatch Instructions to check the completeness and accuracy of their recording on the system, there is not a process to perform and document a secondary or QA review to	<p>Dispatch decisions are based on the Dispatch Schedule calculated by the TSO and as described in more detail in the 2015 Market Audit Report AUP Testing.</p> <p>Both TSOs perform a daily review of the previous day's dispatch instruction data by comparison with</p>

Year	Original Procedure Title	Original Procedure Description	Original Exceptions / Comments	Results of Follow-up
		<ul style="list-style-type: none"> For a sample testing days in 2010 obtain evidence to confirm operation of the above quality processes. For a sample of DIs that have changed between D+1 and D+3 ascertain the reason for the change and confirm the amended DI was provided to SEMO. Identify any DIs provided to SEMO following D+3 (either modifying previous DI records or new DI records). For a sample of such DIs ascertain the reason for late submission/modification and the underlying root cause. 	<p>assess the quality of the primary review decisions and its consistency over time and different personnel.</p>	<p>other data including metering and SCADA data. For one TSO this is facilitated by a defined exception report.</p> <p>For one TSO completion of this process is part of the daily checklist described under procedure 5 above and is subject to the same periodic review by management.</p> <p>One TSO records and tracks all amendments made through this process following consultation with Control Room staff but does not have a formal QA process in place.</p> <p>We completed a walkthrough of these process without exception.</p>
2010	15. The approach to calculation of load and other forecasts is reviewed and approved by management.	<ul style="list-style-type: none"> Confirm process for performing load and wind power unit forecasts, including any required review and approval from both a methodology and individual forecast standpoint. Confirm that required review and approval has been performed, including sample of 2 monthly and 5 four-day forecasts if applicable. 	<p>There is no documentary evidence of a secondary review of load forecasting completed by either SO.</p>	<p>Both TSOs have implemented a tool for demand and wind power forecasting which is used to complete day-ahead and in-day forecasts. There is no formal review of the accuracy of forecasting decisions made by the near-time team. We note that broader trends are identified by management through their adhoc review, for example identifying that additional research is needed into forecasting embedded generation where a PhD student has been commissioned to develop new models.</p>
2010	18. Interconnector trade data is calculated accurately	<ul style="list-style-type: none"> Confirm process for calculation of SO Interconnector Trade data (SIIP, SIEP, SIIQ and SIEQ) including exception identification and tolerance limits. Identify review and approval processes. For a sample of 5 days obtain confirmation that SO interconnector Trade data has been reviewed and approved in line with the above. 	<p>While no errors in the pricing of Interconnector Trades were identified in testing the sample of 5 days, it was noted that there was no documented review of the pricing arrangements that are calculated by the National Control Centre.</p>	<p>Significant changes have occurred to the SO Trading Process, and a three-way reconciliation is now performed between the recorded volumes, counterparty report and Auction Management Platform. These checks are signed off upon completion. We completed a walkthrough of this process without exception.</p>
2011	1) New connections and disconnections are processed accurately and timely.	<p>a) Document process performed to record registration, meter point and Meter Technical Details ("MTD") within relevant SO/MDP systems (including register mapping, correct configuration of</p>	<p>Within our sample of 15 new connections at one DSO we identified:</p> <ul style="list-style-type: none"> Two MPRNs where no major meter test had been completed; and 	<p>Meter Tests are managed through the use of Work Orders, with an associated due date applied and used when scheduling work. We performed walkthrough of a service order to confirm a due date was present as expected without exception.</p>

Year	Original Procedure Title	Original Procedure Description	Original Exceptions / Comments	Results of Follow-up
		<p>main/sub meter etc). Confirm review and approval process.</p> <p>b) For a sample of 15 connections obtain evidence that registration, meter point and confirmation of MTDs was reviewed and approved in line with the above process.</p> <p>c) Confirm process to ensure unit is registered and active within SO/MDP systems prior to energisation.</p> <p>d) For the sample of new connections obtain evidence to confirm all units active within SO/MDP systems prior to energisation.</p> <p>e) Confirm that testing/certification process is in place for new meter connections.</p> <p>f) For the sample of new connections obtain approvals, proving test certificates or other evidence to confirm meters were assessed as required.</p> <p>g) Where exceptions/deviations noted during testing obtain evidence to confirm these were resolved prior to meter point go-live, or were communicated to SEMO as required.</p> <p>h) Document process for managing unit disconnections and to remove / deactivate within SO/MDP systems at point of disconnection/de-energisation.</p> <p>i) Obtain evidence that disconnection process operated for sample of 15 disconnections.</p>	<ul style="list-style-type: none"> • Three MPRNs where the major meter test was completed over 30 days after the energisation date. 	<p>There is no formal monitoring of outstanding Work Orders to confirm that they are completed within the required timescales.</p>
2011	5) Meter reading data is complete.	<p>a) Confirm configured exception categories/criteria within meter reading system, e.g. comparison of actual vs. expected data, matching of actual vs. expected source, data received from de-energised / sealed meter, communication system failure.</p>	<p>For two of the 15 days tested at one entity the reason for the meter reading exceptions and their subsequent resolution had not been documented.</p> <p>In the case of one of the entities it is standard practice for all metering data submitted at D+1 to be based on</p>	<p>The affected entity has implemented a daily system check for metering data using custom exception reports. IT systems now require exceptions to be cleared before data is passed to SEMO.</p> <p>There has been no change to the timing/nature of meter read submission at D+1.</p>

Year	Original Procedure Title	Original Procedure Description	Original Exceptions / Comments	Results of Follow-up
		<p>b) For sample of 15 days obtain meter reading exception reports and review relevant exceptions to confirm appropriate action taken, including review and approval where relevant.</p> <p>c) Confirm process used to regularly QA the actions of the primary reviewer.</p> <p>d) For a sample of QA reviews (dependent on the frequency of review) obtain results of the QA process, confirm appropriate action taken where exceptions identified and compare to dates reviewed in (b) above and understand reason for any differences between QA and Deloitte conclusions.</p>	<p>estimates. This is replaced by actual meter reading data (if available) by D+4. Whilst this does not represent a technical non-compliance it does reduce the ability of participants to identify issues in the Data Verification Period as outlined in section 6.48 of the TSC.</p> <p>At one entity a process to perform a regular QA review of the actions taken has been designed but had not yet operated at the time of our testing in December 2011.</p> <p>At one entity whilst we understand that the work performed to investigate and resolve issues is subject to sample based QA review by management, the performance and outcome of this review only occurs on an adhoc basis. We understand this has been formalised since January 2012.</p>	<p>At one entity clearance of meter reading exceptions is performed on a daily basis based on a formally documented process. Although there is no regular QA of individual actions taken an additional validation check is run prior to the use of meter reads in aggregation processes to identify very high consumption/usage factors in order to detect any materially erroneous data including that arising from incorrect exception clearance. These processes were subject of internal audits in 2014 and 2016 and copies of these Internal Audit reports were obtained. In response to these audits, a full review of processes was carried out internally in 2016 which included sample based checking of process compliance although the sample references were not documented. Processes were updated to reflect the results of this process review.</p> <p>One entity has configured their system such that clearance of each individual exception prompts the user to record a comment regarding the exception clearance which is recorded along with the username and timestamp of the action. We performed a walkthrough of the process without exception. We were informed management review is conducted on periodic basis by the team leader by reviewing historic exception clearance whilst also performing holiday cover. This represents a change from the previous 'spot check' approach as management determined that this approach gave a fuller picture of the performance of each individual due to reviewing a wider range of actions. No documentation is produced from this activity and hence no walkthrough to confirm process operation was possible.</p>
2011	6) Metering data is accurate.	a) Confirm configured exception criteria relating to meter reading data, e.g. missing periods, checksum errors, clock errors, meter alarms and warnings, etc.	For one entity documentation had not been retained to record the results of engineer visits required to resolve exceptions identified on three of the	Since the original work performed the systems and processes at the MDP have been updated as part of a systems replacement process. All site visits are now captured as work orders within the

Year	Original Procedure Title	Original Procedure Description	Original Exceptions / Comments	Results of Follow-up
		<p>b) For a sample of 15 days obtain meter reading exception report and review relevant exceptions to confirm appropriate action taken, including review and approval where relevant.</p> <p>c) Confirm process in place to validate meter readings / pulse data obtained, including main/check meter comparison, tolerances and energy limits, automated and manual meter advance reconciliation.</p> <p>d) For a sample of 15 days (as in (b) above) walk through meter data obtained for a sample unit and confirm validation processes appropriately applied.</p> <p>e) For a sample of 10 changes in metered demand data provided to SEMO following initial settlement for 2011 sample testing dates ascertain the reason for the change in metered demand and the validity of this change.</p>	<p>dates tested. We note that such documentation started to be produced in November 2011.</p> <p>During the period incorrect interval demand meter was transmitted from the TSO to DSO and subsequently submitted to SEMO for one interval demand unit for one date. Although this was detected by validation checks and corrected the updated data was not submitted to SEMO and this was only identified when queried by the registered participant. Following this incident some additional checks have been implemented to try and prevent reoccurrence and the interface for transfer of data between TSO and DSO redeveloped.</p> <p>At one entity a process to perform a regular QA review of the actions taken has been designed but had not yet operated at the time of our testing in December 2011.</p> <p>At one entity whilst we understand that the work performed to investigate and resolve issues is subject to sample based QA review by management, the performance and outcome of this review only occurs on an adhoc basis. We understand this has been formalised since January 2012.</p>	<p>replacement system and data is captured at the point of site visit by the engineer on a handheld device which is automatically populated into the system. Work orders cannot be completed unless the required information is captured. We performed a walkthrough of an example service order to confirm the process operated as described without exception.</p> <p>One MDP had developed an additional validation check in relation to TSO provided data based on application of a volumetric tolerance (two levels are applied, with data above the higher level requiring positive confirmation before it is aggregated and submitted to SEMO). All exceptions and the associated action are logged. We performed a walkthrough of the process for an example of the lower and higher limits.</p> <p>The other MDP has not made significant changes to the processes in relation to TSO provided data and continues to place reliance on the TSO validation steps.</p> <p>See procedure 5 regarding QA of meter read exception processes.</p>
2011	8) Meter reading data is transferred completely and accurately between SO and MDP (where appropriate)	<p>a) Confirm arrangements in place for interval metering performed by SO to be provided to MRSO for aggregation and submission to SEMO.</p> <p>b) Identify controls in place to confirm that data is transferred accurately and completely.</p>	<p>Whilst sufficient controls are in place to confirm complete and accurate transfer of data there little validation applied by the DSO (acting as MDP) for data provided by the TSO, under the assumption that validation is performed by the TSO. We note that</p>	<p>As above at one DSO an additional validation has been implemented by the DSO (acting as MDP) in relation to data provided by the TSO but processes at the other DSO remain reliant on TSO validation.</p> <p>No action has been taken by any entity to discuss / compare the specific validation rules applied</p>

Year	Original Procedure Title	Original Procedure Description	Original Exceptions / Comments	Results of Follow-up
		c) For a sample of 15 days obtain evidence to confirm operation of these controls, including review of exceptions and subsequent resolution where appropriate.	the number and nature of validation checks performed, as well as the specific configuration and limits applied, varies between TSO and DSO and hence inconsistent validation is applied between transmission and distribution connected sites.	between the DSO and TSO in the respective jurisdictions.
2011	9) Aggregation of metering data prior to submission to SEMO is complete and accurate	<p>a) Document controls in place to confirm completeness of aggregation processes (all registers aggregated to meter/MPRN level, all units aggregated for each settlement period for each period, each meter point aggregated only once).</p> <p>b) For a sample of 15 days obtain evidence to verify performance of the controls from (a) and review exceptions to confirm appropriateness of action taken, including review and approval where appropriate.</p> <p>c) Confirm process to manage master data to ensure unique allocation of meter point to supplier unit for aggregation purposes, including allowing for allocation for resettlement following change of supplier.</p>	For one entity of the 15 dates selected for testing there were two where the control reports used to check the aggregation process were not available and hence the performance of the control checks could not be verified for those dates.	Control reports continue to be produced daily as described. We randomly selected May 2016 to confirm all reports were presented as expected and identified that reports were missing for 8 working days in that month. The MDP were not able to provide an explanation for this. We additionally checked February and September 2016 and in both cases all expected reports were available.
2011	11) Exception handling	<p>a) Ascertain process in place to monitor exception levels in meter data collection processes in order to identify trends and issues requiring escalation and root cause analysis.</p> <p>b) Review a sample of exception reports and corresponding actions to confirm process in (a) operates as expected.</p> <p>c) Review exceptions identified from testing under procedures 5 – 9 and confirm they have been considered as part of the exception monitoring processes, if appropriate.</p>	Although there are processes in place to review the overall results of meter data collection exception management to identify trends and issues requiring investigation these are not formalised and hence could not be tested. Whilst this is the case at all four in-scope entities this is of particular relevance to the DSOs given the much larger number of MPRNs for which they are responsible.	<p>At one entity trend analysis is carried out on an informal basis by management. We were able to perform walkthrough of an example action arising relating to a recurring communications fault.</p> <p>Two entities have instituted monthly meetings to discuss metering activities including discussion of any known or emerging issues. One entity produces minutes of the meeting, which were obtained and reviewed for a sample month without exception. The other entity does not produce any minutes for these meetings and hence we were unable to perform any testing of the process.</p> <p>One entity does not perform any specific trend analysis, however management have implemented two annual processes to identify potential metering</p>

Year	Original Procedure Title	Original Procedure Description	Original Exceptions / Comments	Results of Follow-up
				errors for all interval metering: a meter advance reconciliation for a sample of sites annually and a phase-fail test which involves a review of historic consumption and alarm data to identify potential issues requiring investigation. We obtained copies of the output from the most recent execution of each of these exercises in 2016 without exception.
2011	12) The ongoing accuracy of metering equipment is assessed and appropriate steps taken where exceptions are identified	<ul style="list-style-type: none"> a) Confirm process in place to comply with regular inspection requirements. b) Confirm process in place to identify meters requiring adhoc testing. c) For a sample of regular and adhoc inspections/tests required obtain test reports/certificates to confirm performed as required. d) Where exceptions identified (in this sample) confirm appropriate action taken to revise metered data provided to SEMO. 	<p>At one entity there was no formal review or QA of the results of meter tests performed during the year. In addition there was no documented plan or schedule setting out the required meter testing cycle and hence ensuring that all meters are tested at the appropriate frequency.</p> <p>At one entity within the sample of 15 meter tests reviewed we identified two exceptions where the results of the meter test had not been received at the time of our testing despite this being past the six week deadline for the test report to be provided</p>	<p>Since the original work performed the systems and processes at the MDP have been updated as part of a systems replacement process. The batch and service life of each meter is recorded within the system and is used to create work orders to perform required inspections. All jobs are managed through work orders and the results of relevant inspection work orders is reviewed on a monthly basis by the Market Operations Manager.</p> <p>All meter tests are managed as Work Orders. A monitoring report is used to track jobs that have been completed but where paperwork has not been received and aged items are followed up on a weekly basis. We inspected the report at the date of testing and noted no items over six weeks.</p>
2013	6) Meter inspections and dealing with meter failures, theft/losses	<ul style="list-style-type: none"> a) Obtain understanding of sources of exceptions relating to meter readings such as stuck meters or read queries (e.g. meter engineer exception reports, supplier queries, special read requests). b) Review monitoring performed by management to confirm issues are investigated and resolved on a timely basis. Obtain ageing of open items and obtain explanations for a sample of long-running items. For a sample of exceptions that have required retrospective adjustment to meter reading/advance obtain evidence these were done in line with documented procedures and were subject to necessary review and approval. 	<p>For one MDP, 8 of the 22 exceptions that related to a stopped meter (from a total of a 27 exceptions that required retrospective adjustment to meter reading selected for testing) had not been appropriately adjusted. This was due to the meter installer returning a normal removal read rather than an 'unreadable' record. As a result no adjustment was made to the consumption of these meters to reflect the period when the meter was stopped.</p> <p>For one MDP, whilst we did not identify any exceptions which were not handled appropriately, monitoring is</p>	<p>For the MDP noted an exception report has been created to identify instances where a meter reading has been returned on a work order where no reading was expected. This report is monitored on a monthly basis and reads are substituted where required. We performed a walkthrough of this process without exception.</p> <p>For the MDP noted, monitoring of the age of exceptions is performed by Team Leaders on a daily basis. We obtained the ageing report from the date of our testing and confirmed there were no significantly aged items without exception. Monitoring is also performed on a daily basis by Team Leaders on a sample of exceptions to confirm the actions taken were appropriate.</p>

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		c) Review monitoring performed by management to identify trends / patterns in exceptions and confirm appropriate action taken if required.	performed at a departmental level on exceptions within their work queue but there is no overall monitoring performed to confirm issues are investigated and resolved on a timely basis. At both MDPs there is no monitoring performed to identify trends / patterns in exceptions.	At one MDP there is no formal process to monitor for any trends / patterns in exceptions, however each team member is assigned to a designated area and is expected to notify the team leader of any common issues identified. At one MDP, the forum for any trends in meter reading exceptions identified is the monthly metering services management meeting. This meeting is not formally minuted and hence we were unable to review a sample of minutes to confirm the meeting had occurred as planned.
2013	7) Profile production – determining daily/period profile coefficients	a) Obtain documented process/procedures notes for calculation of profile coefficients and the subsequent review and signoff of profiles. b) Obtain evidence that for the profile calculation that relates to the majority of 2013 the profiles were reviewed and approved in line with the process from (a). c) Obtain evidence that the subsequent loading of profiles to SAP was verified / approved.	At one MDP there was no formal evidence of review and approval of the 2013 profile calculation. An email trail of peer review and approval was introduced and maintained for 2014 profiles.	An email trail of peer review and approval continues to operate in respect of profile calculations. This was obtained for the 2017 profile upload without exception.
2013	8) Recalculation of Estimated Annual Consumption (EAC) / Estimated Usage Factor (EUF) and Actual Usage Factor (AUF)	a) Perform walkthrough of calculation of annualised usage factors for a sample of 5 meter points. b) Identify key validation / exception checks incorporated within the calculation of annualised usage factors. Obtain documented process/procedures notes for review and resolution of exceptions. Perform walkthrough of one example to confirm operating consistent with documented process. c) For a sample of validation exceptions obtain evidence that the exception was resolved consistent with the documented procedures.	At both MDPs there are no validation checks incorporated within the calculation of annualised usage factors, although we note that checks are performed at the point of aggregation (see AUP 10 below). At one MDP internal / regulatory targets are not in place in relation to the use of annualised usage factors based on actual meter readings.	At one MDP Validation checks are now run as part of the DUoS billing run, which occurs prior to aggregation. This includes a specific exception report for high usage factors, with usage factors which exceed the defined limits held and the existing EUF used until the exception is resolved. We performed a walkthrough of the exception clearance process for an example MPRN and also confirmed that there was not a significant number of aged exceptions cases requiring resolution without exception. At one MDP usage factor checks are still performed at the point of Aggregation as noted below, although updates have been made to run the

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		<p>d) Confirm internal / regulatory targets in place in relation to the use of annualised usage factors based on actual meter readings. Obtain evidence that these are subject to regular monitoring and that appropriate action has been taken if performance has fallen below target.</p>		<p>checks at D+1 allowing correction prior to submission for initial settlement at D+4.</p> <p>Regulatory targets are in place for the MDP in relation to the percentage of customers who must receive at least one actual read per year and the number of meter reading visits per year. Both metrics are tracked through a monthly SLA report. We obtained a copy of this report for December 2016 and confirmed both metrics were being monitored.</p>
<p>2013</p>	<p>10) Aggregation of EACs/EUFs and AUFs and breaking down into interval values</p>	<p>a) Confirm daily process in place to schedule the required aggregation runs based on the settlement calendar.</p> <p>b) Identify key validation / exception checks incorporated within the aggregation calculation process (including completeness of meter points and validation of usage). Obtain documented process/procedures notes for review and resolution of exceptions. Perform walkthrough of one example to confirm operating consistent with documented process.</p> <p>c) Obtain an understanding of any processes in place for management to regularly review / QA exception resolution activity. For a sample of management review/QA checks obtain results and confirm appropriate action taken where issues identified. If no regular review/ QA performed by management then for a sample of validation exceptions obtain evidence that the exception was resolved consistent with the documented procedures.</p> <p>d) Where profiles are subject to weather adjustment confirm controls in place to ensure weather data is loaded prior to aggregation and test on a sample basis.</p>	<p>At one MDP checks are performed each day following the aggregation run including a check for large usage factors included in aggregation (process introduced in July 2013). On two of the five days tested since this process was implemented the check for large usage factors had not been performed.</p> <p>In addition although not representing non-compliance the following changes could be made to enhance the post-aggregation validation process in place at both MDPs:</p> <ul style="list-style-type: none"> • Incorporating as much validation as possible before the aggregation run. Currently although large usage factors are identified and investigated the usage factors is still used in the aggregation run in the majority of cases and hence is not corrected until the following resettlement run (M+4 or M+13). • Reducing the threshold for inclusion on the large usage factor report for one MDP where it is significantly higher than that applied in the other jurisdiction. This could be reduced 	<p>As noted above changes have been made to include validation of usage factors prior to aggregation for initial settlement at both MDPs.</p> <p>The large usage factor for the MDP noted has not been changed and remains significantly higher than that applied in the other jurisdiction and significantly above the threshold where interval metering is required. We performed a walkthrough of this process for a randomly selected date without exception.</p>

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			<p>whilst still remaining at a level that is unlikely to capture valid usage factors. This could be facilitated by setting separate thresholds by DUoS group.</p> <p>Finally we note that at one MDP, although not an exception to the procedures or a non-compliance on the part of MDP, a significant proportion of the usage factors requiring investigation and adjustment are due to the receipt of customer reads shortly after agent reads hence calculating the usage factor over a small number of days. There may be benefit in investigating whether a minimum read period should be included in the relevant market rules relating to usage factor calculation.</p>	
2015	3) RCUC Constraint Rules	Obtain the most recently set of RCUC constraint rules published on the TSO websites. Compare the published rules to those configured in RCUC and confirm that the published rules completely and accurately reflect the rules within RCUC.	<p>The following differences were noted:</p> <ol style="list-style-type: none"> 1. ROI System Stability (There must be at least 5 high-inertia machines on-load at all times in Ireland. Required for dynamic stability.) Set as 6 in RCUC. On discussions with the Assistant Grid Control Manager we found a weather warning had been issued for the sample day, and changes to constraints had been deliberate to provide ROI with increased reserve. This had been approved by the On-call Engineer. 2. ROI Replacement Reserve (Combined MW output of OCGTs must be less than 493MW (out of a total of 793MW) in Ireland at all times. Required for replacement 	<p>We obtained the most recent set of RCUC constraint rules published on the TSO website and compared them to those configured in RCUC at the point of testing. The following differences were noted:</p> <ol style="list-style-type: none"> 1. ROI System Stability (There must be at least 5 high-inertia machines on-load at all times in Ireland. Required for dynamic stability.) Set as 8 in RCUC. On discussions with the Assistant Grid Control Manager it was noted that this had been adjusted to avoid a large unit that was under test causing other units to be desynchronised. 2. ROI Replacement Reserve (Combined MW output of OCGTs must be less than 493MW (out of a total of 793MW) in Ireland at all times. Required for replacement reserve. The MW values are subject to change as availability of the units change). Set as 230MW in RCUC,

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			<p>reserve. The MW values are subject to change as availability of the units change). Set as 498MW in RCUC on 29 December, due to changes in unit availability.</p> <p>3. Operation Limit for Inertia is 20,000MW, set as 23,000MW in RCUC.</p> <p>Evidence was supplied to show that this was done to prevent oscillations occurring in the system over the Christmas holidays due to low load following issues in the prior year.</p>	due to changes in unit availability and system constraints.
2015	4) Priority Dispatch	Obtain a listing of all units subject to priority dispatch from the SEMO market systems. Confirm that all units have been configured for priority dispatch within RCUC through the use of negative prices.	Follow-up with SEMO identified that the three units that were not subject to priority dispatch in the market data had received SO and regulatory consent to be priority dispatch and should have been configured as such. Because all three are predictable price-takers this will not have impacted SEMO determined Market Schedule or settlement calculations.	The units were updated in the SEMO Market Systems at the time of the 2015 testing. No further action was taken to follow-up as this issue was resolved.
2015	5) Dispatch Process	<p>Perform a site-visit to each SOs control centre. Observe the activities relating to the dispatch of units for a period of up to 2 hours. In particular:</p> <p>a) Confirm an RCUC run is performed based on the expected schedule</p> <p>b) In the event of any significant events (e.g. unit trip) confirm an additional RCUC run is performed to provide an updated dispatch schedule</p> <p>c) For any deviations from the RCUC dispatch schedule obtain explanations for the deviations from the Operator</p>	Whilst no exceptions were noted in testing, it was observed a high number of manual calculations were done on spreadsheets during the preparation of the RCUC run. It is recommended templates are implemented to aid demand and wind modelling to increase efficiency and reduce the risk of manual error.	An all-Ireland spreadsheet template has now been implemented in both control rooms and is used to automate and manage all required calculations. We observed the use of the template during our follow-up visit.

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		d) Confirm all such deviations are recorded within the Operator log		
2015	7) Management of Short Term Issues	Using DI data from the SEMO market systems identify a sample of up to 5 examples where there has been a unit trip. For each item obtain the dispatch instructions and operator logs from the relevant TSO and review the dispatch decisions made as a result of the unit trip, including confirming that an additional RCUC run was performed if required. Confirm that all dispatch instructions were captured within the operator log. Obtain explanations from TSO management for the dispatch decisions made.	Trips and subsequent dispatch decisions are not consistently captured in the Operator Log. This is inconsistent with the local operating procedures within each control room and impacts on the ability of TSO management to review and assess dispatch decisions retrospectively to identify, for example, process errors or training needs.	We were informed that all operators had been reminded of the need to capture events in line with local operating procedures. Both Control Rooms have moved to an electronic Operator Log. We selected two trips at random using DI data from the SEMO Market Systems and were able to confirm in both cases they had been captured in the relevant Operator Log.



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