

**Market
Systems
Development
Plan 8**

May 30

2016

This document fulfils the Market System Development Plan licencing requirement placed upon both SONI and EirGrid by URegNI and CER respectively

**The systems
development
plan for the
Central
Market
Systems.**

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Introduction

The Market Systems Development Plan (MSDP) is a licence requirement placed upon both SONI and EirGrid by URegNI and CER respectively. This plan is produced and reviewed annually in accordance with Condition 16 of the SONI Licence, “Licence to act as SEM Operator” and in accordance with Condition 4 of the EirGrid Licence, “Market Operator Licence granted to EirGrid plc.”

This document is the eight Market System Development Plan (MSDP) developed by SEMO for the period from 1st October 2015 to 30th September 2017. The plan identifies the issues that SEMO face in relation to the operation, administration and development of the Single Electricity Market (SEM).

Scope of Plan

The MSDP is designed to provide a view of upcoming activities in the market, in addition to the update on market changes. It provides a forward view of upcoming system requirements, as well as acknowledging future policies that will impact on the SEM. The content of the plan thus reflects this development of the SEM. The plan is accordingly structured with the following Sections:

Section 1 aimed at providing a high level overview of SEM IT systems and illustrates the range of Central Market Systems that SEMO develop, maintain and support.

Section 2 This section identifies work progressed and completed since MSDP7.

Section 3 Provides a summary of the content of upcoming releases.

Section 4 This Forward Work Programme section identifies areas of potential work and their possible impacts. The initiatives described in this section are not a definitive list but rather what is likely to be addressed based upon the future work programmes of the Regulatory Authorities and industry developments within the period, 2015 to 2017.

Section 5 relates specifically to IT projects under commitment or proposed. This section provides an update on the progress of the Capital Programme approved in the current SEMO Price Control 2013-2016 (SEM-13-054).

For clarity the MDSP pertains to the existing SEM market, it does not include any works related to the development of the new I-SEM. However, as advised by the Regulatory Authorities the I-SEM is expected to be come into effect in Q4 2017, as such there is a requirement to continue to operate the existing SEM until then and potentially in parallel to the new I-SEM to the end of 2018 under current market rules which require M+13 arrangements.

Section 1 – Overview of the SEM Systems

The purpose of this section is to provide a brief overview of the SEM Central Market Systems (CMS) so readers of this document can conceptualise the complexity and structure of the market systems. In particular, this section provides a brief description of the key functionality contained within each of the core CMS subsystems (see page 5) along with some of the key data feeds and participant interactions with the market processes. The diagram also identifies some of the vendors that provide the various parts of the overall Central Market System solution.

Market Infrastructure (MI) system

The Market Infrastructure (MI) system is the main interface for Participants, Transmission System Operators (TSOs), Meter Data Providers (MDPs) and Interconnector Administrators (IAs). It provides communications through screens (Type 2) and through computer-to-computer interactions via Web Services (Type 3). It also provides an interface to SEMO to allow monitoring, control and operation of the SEM. The main functions of the Market Infrastructure (MI) System are as follows:

- **Registration** – including registration of Participants, Users, Trading Sites, Units and Meters.
- **Trading** – the mechanism for submitting, revising and querying Default Offers and Normal Offers.
- **Event Management** – schedules programs and events, so much of the SEM operation is automated.
- **Report Management** – generates reports for Participants, SEMO, TSOs and IAs.
- **Market Operator Interface** – the interface used by SEMO to monitor, control and run the SEM.
- **Interface to Other Systems** – interfaces between CMS and with some External Data Providers.

Scheduling and Pricing (MA)

The Market Application (MA) system (which includes the MSP Software) performs the following key functions:

- **Calculation of Market Schedule Quantities** for Ex Ante 1, Ex-Ante 2, Within Day, Indicative Ex Post and Initial Ex Post Market Schedules.
- **Calculation of System Marginal Prices** for Ex Ante 1, Ex-Ante 2, Within Day, Indicative Ex Post and Initial Ex Post Runs.
- **Calculation of Dispatch Quantities** (using the Instruction Profiling module) for Ex Post Runs.

MIUN Calculator (MIUN)

Following the calculation of Interconnector Unit Nominations (IUNs), the MIUN Calculator is used to provide the required data to relevant systems, notably the Market Infrastructure System (MI) and the Auction Management Platform (AMP):

- **Modified Interconnector Unit Nominations (MIUNs)**, the energy allocations to Interconnector Units; and
- **The Interconnector Dispatch Schedule (DIs)**, the dispatch profile for the Interconnector as a whole.

The MIUN Calculator includes additional rules/constraints to those contained within the MSP Software; to ensure that the dispatch profile is feasible at all points. The additional constraints include application of the relevant Interconnector Ramp Rate, treatment of Deadbands (where such restrictions apply) and provision for instances of Interconnector trips.

Settlement System

The CMS Settlements System calculates the amounts payable by or to be paid to Participants, in accordance with the provisions of the Code. In particular, this includes:

- Calculation of all payments and charges on a weekly (Billing Period) basis for Energy Settlement or monthly (Capacity Period) basis for Capacity Settlement.
- Management and reconciliation of currency costs incurred in the SEM for all payments and charges.
- Preparation of Invoice data for use in the Invoicing System.

Invoicing System

The Invoicing System manages the production of Invoices, which provide a summary of the amounts payable by or to Participants (including correct jurisdictional treatment of VAT and currency) for the relevant Billing Period or Capacity Period.

Metering System

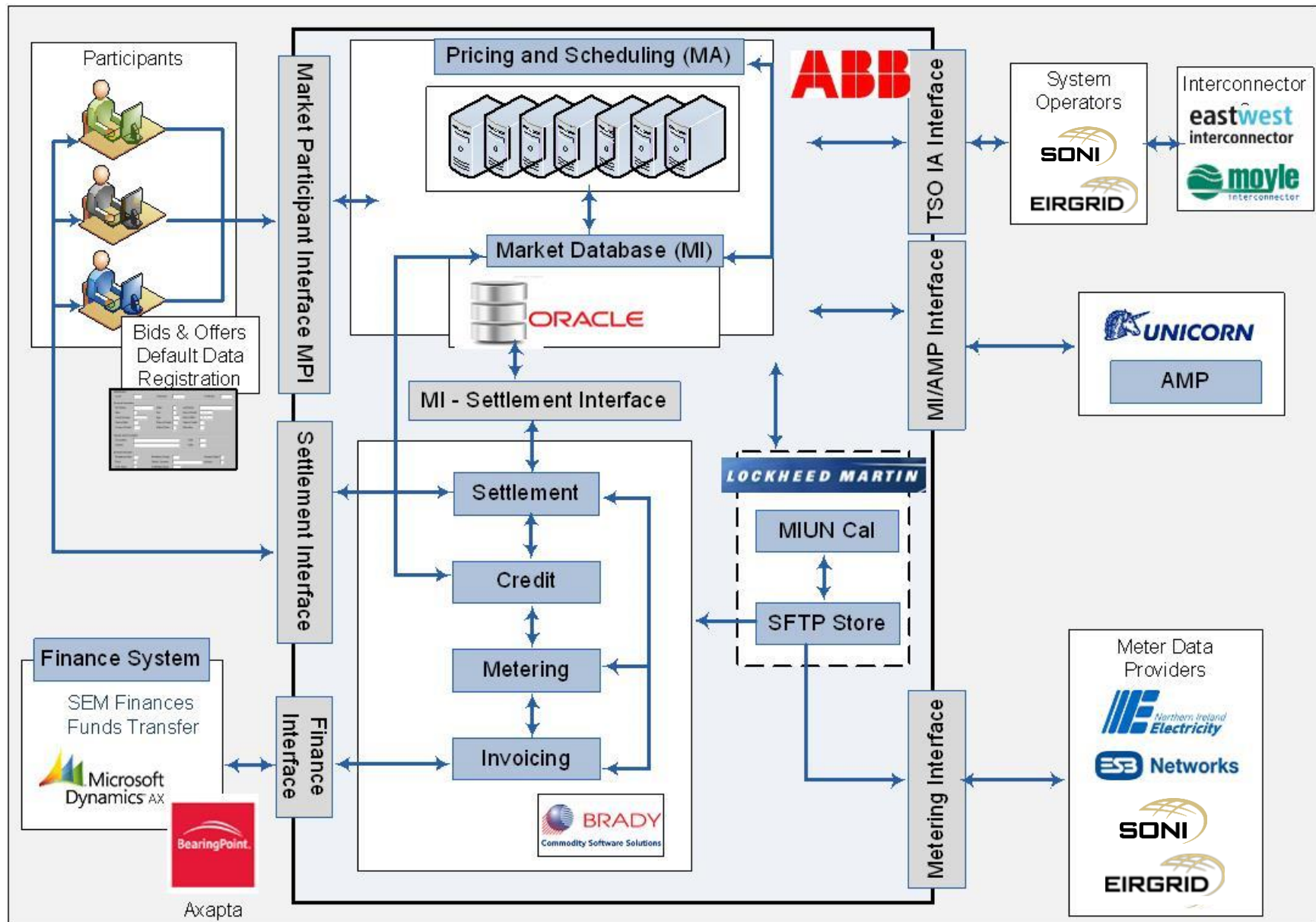
The Metering System manages the receipt of meter reading data from Meter Data Providers (MDPs); logs receipt of data; and transfers meter data to the Settlement, MI or MA systems for use in further processes.

Credit Risk Management System

The Credit Risk Management (CRM) system manages Participant credit risk by evaluating their outstanding liability and a forecast of expected liability in the near future (this data is transferred from the Settlement System or Finance System). The calculated liability is matched with the total collateral posted by the Participant.

Finance System

The Finance System manages and monitors payments of Invoices and debtor information with respect to Participant liabilities within the SEM.



Section 2 - Progress since MSDP7

SEMO has continuously communicated with Market Participants regarding the scope and likely impact of the scheduled biannual releases to the Central Market Systems (CMS). This has included, where relevant, detailed information on each release to allow Market Participants to design, plan and implement any changes necessary to their systems to align with these CMS releases. The following section provides a brief overview of the October 2015 CMS release and developments with respect to the CMS Roadmap.

October 2015 Release

The SEM R2.7.0 release to the CMS was deployed to schedule on October 2nd, 2015, ensuring ahead of time delivery of reporting capability to comply with the Regulation on Energy Market Integrity and Transparency (REMIT).

There were two approved Change Requests included in the release scope:

CR or MOD ID	Change Request/Modification Description
<i>Mod_09_14</i>	<i>Amendment to Make Whole Payments for Interconnector Units</i>
<i>SEM_PC_CR349</i>	<i>Regulation on Wholesale Energy Markets Integrity and Transparency - REMIT</i>

Table 1 SEM R2.7.0 Release scope

Central Market Systems Roadmap

In the context of IT systems a “Roadmap” describes how the system(s) will be developed, maintained and operated over a specific timeframe specifically stating how IT technology will support business operations over the short and longer term. Clear visibility of the Roadmap for the Central Market Systems (CMS) is a critical enabler to ensuring Market Participants and other SEM stakeholders systems align, both functionally and technically, with the CMS to support efficient SEM operations

SEMO continually reviews the third-party products employed and incorporate their evolution as part of a planned release strategy. As part of this review SEMO identified that a fundamental decision was required with regard to the ‘Roadmap’ for the following reasons:

- Target I-SEM go-live of Q4 2017;
- Likelihood of ceasing bi-annual release activity in 2016 (when the current vendor contract expires); and
- CMS life cycle nearing what is the industry standard “best practice” refresh window (typically five years).

SEMO extensively engaged with key vendors (ABB & Brady) to review and set out the potential options for the CMS roadmap. Impact assessment studies including high-level cost estimates were a key input into discussions. Multiple options were considered however, due to the tightly coupled nature of the systems and inter-dependencies between various components only two viable options were identified:

- “Maintenance Mode” - minimisation of change
- “Upgrade Mode” – pro-active refresh of hardware, 3rd party software and business applications.

The Roadmap was initially raised at the I-SEM Joint Project Board meeting of October 15th 2015 where SEMO presented the operational context, key assumptions, details and risks of both options. The Regulatory Authorities subsequently instructed SEMO to engage with all SEM stakeholders, informing them of the options available with a view to gathering and reviewing stakeholder feedback to determine an appropriate way forward.

On November 25th 2015 SEMO hosted a Market Operator Special Topic (MOST) meeting at which SEMO made a detailed presentation covering:

- Operational Context;
- Key Assumptions;
- Roadmap Options (including high-level cost estimates and risk associated with each);
- Other Operational Factors (Resettlement etc); and
- Feedback request.

The meeting was well attended and engagement from the attendees was strong. Feedback on the format, content and execution of the session was very positive. At the conclusion of the meeting SEMO requested that stakeholders submit completed feedback forms by December 7th 2015 on the preferred Roadmap approach for their organisations, the key considerations being:

- Security (of the CMS and stakeholder systems);
- Their current application and technology stack and future plans for these;
- Resourcing aspects (in the context of Business As Usual (BAU) and I-SEM delivery commitments);
- Costs / Return on Investment; and
- Risk appetite.

Significant stakeholder responses were received by SEMO - written feedback was provided from 8 Participants and indicated a strong preference to adopt “Maintenance Mode” as the preferred Roadmap option with 7 of the 8 Participants favouring Maintenance mode over the Upgrade mode option. This reflected the initial impression given by the meeting attendees on November 25th.

SEMO subsequently made a detailed submission to the Regulatory Authorities to inform a decision by them on potential options for the future roadmap of the CMS. This submission provided the following information:

- Activities carried out to date with respect to the CMS Roadmap;
- A summary of the viable options following extensive vendor engagement;
- Details of SEM stakeholder engagement and feedback;
- A recommendation from SEMO based on its review and stakeholder feedback; and
- A request for Regulatory review and decision on way forward.

In line with the views expressed by SEMO, and the majority of market participants, the Regulatory Authorities, on January 5th, advocated the adoption of the Maintenance Mode approach. The preferred approach will inform all future development and maintenance of the CMS.

Modifications Summary

The table below gives a breakdown of modifications that SEMO have worked on since MSDP7; 1st March 2015 to 28 April 2016 and relevant documentation can be found on the SEM-O website.

Modification Status	Number
Implemented	7
Awaiting RA Decision	2
In Progress	2
Recommended for Rejection	4
Withdrawn	0
Total	15

Table 2 Modification progress since MSDP7

Section 3 - Forthcoming Market Releases

June 2016

The release cut-off date for the SEM R2.8.0 release to the Central Market Systems was Friday, November 6th, 2015. There were no approved Modification Proposals or new SDS sourced Change Requests as at the release cut-off date. However, SEMO submitted a proposed scope to the Regulatory Authorities in early January 2016 to deliver the following in the SEM R2.8.0 release:

CR or MOD ID	Source	Change Request/Modification Description
<i>SEM_PC_CR351</i>	<i>Market Audit</i>	<i>Sort Change for PUMP Eligible Availability</i>
<i>SEM_PC_CR354</i>	<i>Revenue</i>	<i>Irish Revenue – Electricity VAT Change</i>
<i>SEM_PC_CR353</i>	<i>Technical Requirement</i>	<i>Oracle iPlanet webserver Upgrade</i>

Table 3 SEM R2.8.0 Release scope

The SEM R2.8.0 release will also implement a number of technical changes to ensure the CMS remain aligned with supported third-party products. Regulatory approval for the release scope was received on February 1st, 2016. The release is scheduled for deployment on Friday June 17th 2016, subject to successful completion of all testing¹.

The SEM R2.8.0 release will be the **final** Central Market Systems release under the terms of the vendor (ABB & Brady) release agreement 2013 – 2016. Consequently there will be no further scheduled bi-annual releases to the Central Market Systems after this release. Technical updates and data archival activities will continue to ensure patching of equipment continues and performance of the systems is maintained. This approach aligns with the agreed Roadmap option (“Maintenance Mode”) for the Central Market Systems for the period through to SEM de-commissioning.

Existing Change Control mechanisms, such as the Modifications Committee, the SEM Design Service etc., will remain in place to support ad-hoc releases if required.

¹ This release has now been deployed as scheduled, prior to final approval of this document.

Section 4 - Forward Work Programme

Introduction

Changes to electricity market provisions in the SEM have historically emerged in response to legislative requirements and policy considerations. With the advent of the I-SEM market arrangements due for October 2017 the impact of such initiatives on the current SEM systems has diminished. There is no anticipated policy or legislative change expected to have an impact on the current SEM design in the interim period between the final scheduled Central Market Systems release in June 2016 and I-SEM go live in October 2017. Likewise, there is no currently open Modification Proposal expected to have an impact on the SEM Central Market Systems. Notwithstanding the need to remedy identified defects or critical design issues, as agreed as part of the Modification Panel process, SEM is not expected to change significantly before the implementation of the 'target model'

Due to the requirement to transition to the new market arrangements any market system changes beyond June 2016 are expected to relate to closure of the current SEM and the period post I-SEM go live where current SEM resettlement will be running in parallel with the I-SEM arrangements.

A Modification Proposal in relation to these transitional arrangements had been under development. This would have given consideration to the possibility of shortening of resettlement timelines to facilitate a more efficient market closure. However, the proposal was rejected by the Modifications Committee, and the decision was made to continue with the M+13 resettlement period.

Policy and Development Initiatives

No current Policy or development initiatives are expected to impact the current SEM Central Market Systems as these will be captured within I-SEM.

Market Integration

European electricity market integration represents the next major development of the trading arrangements on the island of Ireland. Since 2007, the SEM has provided a stable and transparent platform for the wholesale trade of electricity in Ireland and Northern Ireland. Beyond 2014 (2017 for Ireland and Northern Ireland), EU member states have agreed to implement the 'target model' of day ahead price coupling and continuous intraday trading. This will also include provisions for forward trading and balancing. Implementing the target model will contribute to enhanced cross-border trade and competition on the island of Ireland and will introduce a greater level of flexibility to the trading arrangements to complement increasing amounts of variable renewable generation.

A Q4 2017 commissioning of the I-SEM will operationally impact all SEM stakeholders necessitating an extension to the lifetime of existing systems and continuity in vendor support arrangements over an extended time period. In addition, transitional arrangements to cutover from the CMS to the I-SEM will shape future operational timelines and requirements. Under current M+13 arrangements, resettlement in the SEM may extend operational activities, in parallel to I-SEM operations, to end 2018. SEMO is engaging with the Regulatory Authorities around these aspects with a view to ensuring a well co-ordinated, smooth and efficient transition to I-SEM operations.

Future SEM Developments and Modifications

No current modifications are expected to impact the current SEM Central Market Systems. Should any additional changes to the CMS be required then this will be treated as an "ad-hoc" release and separately negotiated with the vendor.

In the midst of these emerging developments we emphasise our continuing focus and commitment to the ongoing stable and transparent operation of the SEM. This is important to attract continued investment needed to manage and ensure security of supply, and to ensure we meet renewable targets. Whilst the SEM will undergo significant change as part of Market Integration, this will not occur before Q4 2017, meaning the current market arrangements will need to continue for the next one and a half years, and potentially in parallel with the new I-SEM when current re-settlement (M+13) arrangements are taken into consideration.

This is in recognition that any major changes should be considered in scope for I-SEM development, as a more cost efficient way of realising associated benefits in the medium to longer term.

Capex Programme 2013-2016

Table 4 below provides a brief update on the progress to date of the Capital Projects provided for in the SEMO 2013-16 Revenue Control Decision (SEM-13-054).

No	Capital Project	Project Description	Project Status
1	CMS Infrastructure	Three year Delivery timeline. Project will ensure the resilience of the CMS is maintained and the systems operate on fully supported platforms.	This piece of work will progress throughout 2013-2016. Server replacement program continues and aligns with end of life / warranty of CMS server estate – In Progress
2	Website Infrastructure & Services Upgrade	This project will replace obsolete hardware to cope with exceptional growth which is far beyond expectations when originally designed. In addition the existing website software will be updated as required.	Project will leverage virtualisation approach Phase 1: VMWare platform build – Complete Phase 2: Release incorporating Change Requests to provide additional functionality – Complete Phase 2 SEMO primary and DR websites to migrate to VMWare Q2 2015 – Complete
3	Sharepoint: Upgrade & Hardware Refresh	Sharepoint is a key operational support tool in operation since 2007. This project will replace obsolete hardware, upgrade sharepoint software to a supported version (V2013), migrate data to the new version and enhance data storage capability	Project will leverage Virtualisation approach. Phase 1: VMWare platform build - Complete. Phase 2: Sharepoint upgrade (V2007 to V2013) – Complete Phase 3: Custom logic conversion Q1 2015. – Complete Phase 4: Training and Go-Live – Complete
4	Corporate Systems Refresh	Update and optimise data storage and routing capabilities including updating the corporate Storage Area Networks (SANs), replacing load balancers and replacing the backup system.	Phase 1: External Corporate firewalls upgrade – Complete Phase 2: Upgrade of RightFax solution - Complete Phase 3: Internal Firewalls and Load Balancer upgrade – Complete Phase 4: RSA (remote authentication) upgrade - Complete Phase 5: Upgrade of the backup solution - Complete Phase 6: Corporate server replacement program continues and aligns with end of life / warranty of corporate server estate. This aspect of the project will progress throughout 2013-2016 Phase 7: Implementation of VPN solution for vendor connectivity - Complete
5	Telecommunications Links	Key infrastructure components providing fully redundant, consistently available high	Project Complete.

performance links between SEMO sites.		
6	Technical Upgrade of Microsoft Dynamics	<p>Upgrading the MS Dynamics software which covers both Market and SEMO Corporate finance.</p> <p>Project to refresh hardware will commence in mid 2016. The Software upgrade will not now proceed. Taking into account the status of the software, and noting the timeframe for the introduction of I-SEM (Oct '17) this project is not now warranted.</p>
7	Security Intrusion (Protection of CMS)	<p>Delivery of a Network Intrusion Detection System (NIDS).</p> <p>Project Complete</p>
8	Virtualisation of Oracle & network devices	<p>This project will virtualise</p> <ul style="list-style-type: none"> • non-Production Oracle databases • Cisco network equipment in Belfast data centre <p>Analysis complete. This Project will not now proceed. This would be a significant project and the scale of works would be more aligned to Upgrade Mode as opposed to the agreed Maintenance Mode for the market systems. As such given the introduction of I-SEM (Oct '17) this project is not now warranted.</p>
9	Upgrade of Supportworks Helpdesk	<p>This project will provide a lifecycle upgrade for the software used by the Market Helpdesk.</p> <p>Analysis complete. This Project will not now proceed. Taking into account the status of the system and noting the timeframe for the introduction of I-SEM (Oct '17) this project is not now warranted.</p>

Table 4 Capex Programme 2013-2016

Appendix 1 Modifications

Modifications included in versions 17.0 and 18.0 of the T&SC	Modification effective Date	T&S Code Sections or AP Modified	T&SC Version
Mod_01_15 Tolerance for Metered Volume Changes in Settlement Queries	6 March 2015	AP 16 Section 2.1	17.0
Mod_03_15 Correction of Error in AP04	7 May 2015	AP04 Appendix 2 table 9	17.0
Mod_12_14 (09_14) Amendment to Make Whole Payments for Interconnector Units	02 October 2015	T&SC Section 4	18.0
Mod_05_15 Representation of Interconnector User Participants on the Modifications Committee	15 June 2015	T&SC Section 2; T&SC Glossary; Agreed Procedure 12	18.0
Mod_06_15 REMIT Data Reporting by the Organised Market Place to ACER	02 October 2015	T&SC Section 3; T&SC Glossary; Agreed Procedure 5	18.0

Table 5 Modifications included in versions 17.0 and 18.0 of the T&SC

Modifications not yet included in latest versions of the Code to date (V18.0)	Date Modification was raised	T&S Code Sections or AP Modified	Mod Status
Mod_08_14 Clarification of SEM Collateral Reserve Accounts	18 Sept 2014	T&SC 6.19	Awaiting RA Decision (Recommended for Approval)
Mod_02_13 Registration of Charges	21 Nov 2013	T&SC Section 2 and Section 6, AP 1, AP 9 AP 17 , Glossary	Awaiting RA Decision (Recommended for Approval)
Mod_10_14 Make Whole Payments for IC Units	14 Nov 2014	T&SC Section 5	Recommended for Rejection
Mod_11_14 Pay-As-Bid / Paid-As-Bid for Interconnector Units	20 Nov 2014	T&SC 5.91	Recommended for Rejection
Mod_12_14 Amendment to Make Whole Mechanism to remove Settlement Periods of simultaneous import and export flows	20 Nov 2014	T&SC 4.140-4.140A	Recommended for Rejection
Mod_21_12 Amendment to Available Transfer Capacity (ATC) definition	11 Sep 2012	T&SC, Appendix K and AP2	Recommended for Rejection

Mod_12_13 Amendment to Special Units Pumped Storage definition to include Energy Storage	20 Nov 2013	Glossary, Appendices H, I, M, N, and O TSC clauses 2.34, 4.36, 4.78, 5.109 through 5.141, 5.168, 8.57	Implemented
Mod_09_15 Amendment to Update Process re Submission Failure	19 Nov 2015	AP 07	Implemented
MOD_08_15 Clarification of Outturn Availability	19 Nov 2015	T&SC Section 1	In progress
MOD_04_15 Modification to Relevant Meter Operator Role and support requirements for Meter Communication Channels	20 Mar 2015	T&SC Section 3; T&SC Appendix L; T&SC Glossary	In progress

Table 6 Modifications not yet included in latest versions of the Code to date (V18.0)