

AIME Revenue Submission

27th February 2007

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Executive Summary

Introduction

This submission to the CER and NIAER, collectively known as the RAs, has been prepared by the SMO in its role as the wholesale electricity market operator for the island of Ireland. The submission reflects the SMO's best estimate of expected expenditure required for running the wholesale electricity market in the Ireland over the 11 month period from November 1st 2007 to September 30th 2008 inclusive and includes all project costs incurred to date that are recoverable through the SMO/AIME.

The SMO Business

AIME's position in the market is explicitly defined in the T&SC, which sets out the rules, procedures, terms and conditions which all parties including AIME must adhere to in order to participate in the SEM. AIME will administer daily bid/offer capture, market scheduling and price determination. It will produce daily, weekly and monthly settlement and invoicing statements for electricity, constraints, capacity payments and AIME charges. In conjunction with this it will execute weekly and monthly clearing services for electricity, constraints, capacity payments and AIME charges. AIME will ensure that SEM will be a fully collateralised market and through the management of market participants' credit requirements on a daily basis. AIME is charged with managing currency risk on behalf of market participants. AIME has a role in query and dispute resolution and market change administration and development. AIME undertakes these roles through the Disputes Resolution Board and Modifications Committee. Finally AIME will be involved in the continuous provision of market information.

Assumptions

AIME has made a number of assumptions in preparing this submission. The details of this submission have been determined on an analysis of AIME's obligations using T&SC v1.0, and the draft licences used for consultation AIP/SEM/159/06. For the purpose of this submission it has been assumed that there will be no additional responsibilities assigned to AIME.

At the RAs request, it has been assumed that the "Go Live" date for SEM will be November 1st 2007 and that the tariff control period will run until September 30th 2008. All actual and estimated expenditure and tariffs have been provided on that basis.

For the purpose of this submission all expenditure and tariffs are presented in Euro. Any money either collected or paid in GBP has been projected in GBP and then converted to Euros at a budgeted exchange rate. This submission is made in 2007 money terms unless otherwise stated, that is all expenditure to date has been inflated from the month it was incurred to mid-2007.

SEM Expenditure

SEM Expenditure covers all the costs incurred by, or recovered through, AIME in developing, establishing, and operating the SEM in order to comply with the terms of the legislation, Market Operator Licences and T&SC. There are three aspects to this expenditure, capital expenditure, operating expenditure and imperfections expenditure.

The capital expenditure that will be incurred by AIME up to Go Live, includes three elements. This capital expenditure will be recovered over a 5 year period and is summarised in the table below. Note that no capital expenditure has been included in this revenue submission for the year 1 capital programme.

Table 1 Capital Expenditure Summary

Capital Expenditure (€000s)	
SEM Programme	42,609
SMO Establishment	8,070
AIME Market Trial	3,783
Total	54,462

The forecast operating expenditure required by AIME is summarised in the table below. It covers the 11 months of operating costs that AIME expects to incur from November 1st 2007 and will recover over that period.

Table 2 Operating Expenditure Summary

Operating Expenditure (€000s)	
Payroll	5,395
Professional Fees	1,200
Facilities	1,247
IT & Telecommunications	2,377
Research & Development	250
Depreciation	9,985
Currency	0
General & Admin	497
Working Capital	0
Total	20,951

Imperfections expenditure is treated separately to AIME capital and operating expenditure. It is not a cost within the control of AIME itself. The system operators are responsible for forecasting and controlling imperfections and AIME is deemed to administer imperfections charging and payments. The imperfections expenditure that is expected to be recovered by AIME over the tariff period is shown in the table below:

Table 3 Imperfections Summary

Imperfections (€000s)	
Constraints	109,254
Total	109,254

Investment Return

AIME tariffs should cover its reasonably incurred costs with fair remuneration to shareholders/parents. The approach to date adopted by Regulators in both jurisdictions with respect to the TSOs has been to allow a return on their investment, by applying their Weighted Average Cost of Capital (WACC) to their Regulatory Asset Base (RAB). Both parents have invested substantial capital in AIME in order to deliver the SEM for the RAs.

The AIME proposal is to use two separate WACCs. This will result in EirGrid and SONI receiving a return on their investment which accurately reflects the cost of providing that investment. It should be noted that the approach being recommended is to have a separate WACC for EirGrid and SONI and that their historically agreed WACCs be used.

Table 4 Investment Return Summary

Investment Return (€000s)	
Total	2,672

Tariffs

There is a suite of market operator tariffs designed to recover AIME costs. The proposed methodology has been presented to the industry in an earlier paper, SEM Tariff Charges Methodology, published on 24 November 2006 and consulted upon with the industry.

To summarise the proposed approach, all operating expenditure is recovered from suppliers on an energy basis through the Variable Market Operator Charge and the cost of capital is recovered from suppliers and generators on a per unit basis. There is an Imperfections Charge to recover (un)instructed imbalance and make-whole costs from suppliers on an energy basis. In addition, there are two fees levied on all participants before they can begin trading in the SEM, an Accession Fee and a Market Participation Fee. These are activity based charges that recover the costs associated with accession to the T&SC, registration and participant training.

Table 5 AIME Tariff Summary

AIME Tariffs	
Fixed Market Operator Charge (Monthly)	€3,239/Unit
Variable market Operator Charge	€0.597 /MWh
Accession Fee	€6000/Party
Participation Fee (Generator))	€13,750/Unit
Participation Fee (Supplier)	€12,250/Unit
Imperfections Charge	€3.113/MWh

Incentives

AIME proposes that incentivisation for this revenue submission period should be based on assessing AIMEs performance in relation to its T&SC obligations, with the aim of improving the product provided to its customers. Further incentives, for example around AIMEs operating costs, are more appropriately introduced in a gradual, controlled manner. As key uncertainties become reduced, costs can be forecast in a structured manner, and AIME can achieve effective control over the primary drivers behind such costs. A separate submission will be made on incentivisation.

Glossary of Terms

All the terms used in this submission are consistent with those used in the T&SC. Some of the main ones are defined below for convenience. However, if there is any doubt as to the definition of a particular term the T&SC v1.0 is the correct source.

Actual Dispatch: the actual dispatch instructions issued to generators by the TSOs that takes into account system operational requirements, generator availabilities and technical capabilities as well as generator offer price data.

Balancing Cost: A working capital draw down by AIME to reflect differences in revenues received from ex ante charges and payments made to participants..

Constrained On/Up: If a generator is not scheduled to run in the market schedule (i.e. it is more expensive than the marginal generator) but the TSOs require it to be run in the actual dispatch then the generator is 'constrained on'. A generator may also be 'constrained up' if it is on in the market schedule but is run at a higher level in the actual dispatch. A constrained on/up generator will be paid for its energy according to its offer price which, as it was not on the market schedule, will be above the SMP.

Constrained Off/Down: If a generator is scheduled to run in the market schedule (i.e. it is the marginal generator or cheaper than the marginal generator) but the TSOs require it to be run in the actual dispatch, the generator is 'constrained off'. A generator may also be 'constrained down' if it is on in the market schedule but is run at a lower level in the actual dispatch. A constrained off/down generator will still receive payment from the market based on its market schedule, even though it didn't generate at this level, but will pay back the avoided fuel costs.

Contractual Joint Venture (CJV): is a venture where the parties combine their resources in the furtherance of a single business enterprise without actual partnership or corporate designation.

Demand Side Unit: A Demand Side Unit, u, is Demand that is Dispatchable under the terms of the Grid T&SC, which is represented by unique Metered Demand, MDuh, Availability Profile, APuh, Market Schedule Quantity, MSQuh, and Dispatch Quantity, DQuh, the rules for provision and calculation of these quantities set out in the T&SC.

Dispute Resolution Board: This means the dispute resolution board established pursuant to paragraph 2.215.

Framework Agreement: This is the agreement which a party wishing to be Party to the T&SC and/or participate in the Single Electricity Market must execute and pursuant to which the T&SC becomes binding on each Party.

Generator Unit: A Generator Unit, u, is a Generator Registered by a Participant under the T&SC, represented on a Trading Period basis, t, by unique Metered Generation, MGuh, Availability Profile, APuh, and Market Schedule Quantity, MSQuh, and Dispatch Quantity, DQuh, where appropriate, the rules for provision and calculation of these quantities set out in the T&SC.

Market Schedule: the market schedule is determined based on the rules set out in the Trading and Settlement Code (T&SC) as implemented by AIME. The schedule consists of a stack of generation, ordered according to generator offer price, with the last generator added to the stack to meet the required demand known as the marginal generator. This generator sets the price for all generators scheduled to run in the market (known as the System Marginal Price, SMP). The market schedule takes into account many (but not all) generator technical capabilities but does not account for any transmission related restrictions. A generator's market schedule will effectively determine its revenue from the market even if its actual dispatch is different.

Modification Committee: The committee established from time to time for the purpose of processing Modification Proposals in accordance with paragraphs 2.82 to 2.176 of Section 2.

Participant: Any Party or such business division or undertaking of a Party which has been designated as, or deemed to be, the "Participant" in relation to any Units which have been registered in accordance with the Participation process set out in paragraphs 2.16 to 2.31.

Party: Party means any person who is for the time being bound by the T&SC pursuant to the Framework Agreement and shall include its successors and permitted assigns.

Regulatory Authorities: Regulatory Authorities means the NIAER and the Commission and the term "Regulatory Authority" shall be construed accordingly to mean any one of them as the context admits or requires.

Supplier Unit: A Supplier Unit, v, is the aggregated metered consumption of a single or collection of Demand or Generators that are not Generator Units or Demand Side Units, represented on Trading Period basis, t, by unique Metered Demand, MDvh, the rules for provision and calculation of these quantities set out in the T&SC.

Unit: A Unit is a Generator Unit, Supplier Unit or Demand Side Unit.

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1. Introduction

1.1. Purpose of Revenue Submission

This submission to the Commission for Energy Regulation (CER) and Northern Ireland Authority for Energy Regulation (NIAER), collectively known as the Regulatory Authorities (RA), has been prepared by the Single Market Operator (SMO), trading as AIME, in its role as the wholesale electricity market operator for the island of Ireland. The submission reflects the AIMEs best estimate of expected expenditure required for running the wholesale electricity market in the Ireland over the 11 month period from November 1st 2007 to September 30th 2008 inclusive.

The Single Electricity Market (SEM) will be operated centrally by AIME which will be established under the legislation. AIME is responsible for the operation, planning and development of the SEM and is charged with delivering all-island market services to participants across the island.

The AIME Revenue Submission process began in April 2006 and has been undertaken incrementally in a number of steps agreed with the RAs. The first step was the development of, and consultation, on the SEM Tariff Charges Methodology. This was a consultation on the proposed methodologies for determining the Tariff Charges as per the Trading & Settlement Code (T&SC) and occurred during the autumn of 2006. This Revenue Submission paper forms the second part of the process. The AIME Revenue Submission involves the ascertainment and submission of AIME's revenue requirements based on the methodologies agreed in the SEM Tariff Charges Methodology consultation. AIME is submitting this paper in fulfilment of that requirement.

It is important to note that in addition to the Tariff Consultation, the details of this submission have been determined on an analysis of the SMOs requirements using T&SC v1.0¹, and the draft licences used for consultation AIP/SEM/159/06. For the purpose of this submission it has been assumed that there will be no significant additional responsibilities assigned to the AIME.

1.2. Context

The European Commission has put in place a legislative framework, EU Directive 2003/54/EC (and prior to that, Directive 96/92/EC), requiring all member states to liberalise their electricity markets, and introduce competition. The aim of these reforms is to foster competitiveness, and achieve macroeconomic efficiencies, for the benefit of the citizens of member nations.

Key elements of these reforms include open access to transmission capacity, progressive opening of the retail market, and establishment of mechanisms for the spot trading of electricity. As members of the European Union, the Republic of Ireland and Northern Ireland (as part of the United Kingdom) are required to implement such mechanisms within their respective jurisdictions. There are currently two geographically distinct wholesale electricity markets on the island of Ireland. These markets are governed by separate legislative, regulatory and contractual arrangements.

¹ Where reference is made to the T&SC the version number is given first and then the paragraph in that version that is being referenced, e.g. (T&SC v1.0 6.130) refers to version 1.0 of the Trading and Settlement Code, paragraph 6.130 of section 6 (Financial and Settlement).

Set against the background of the European Union's two Electricity Directives, which require all members to liberalise their electricity markets the Governments of the Republic of Ireland and the UK published a joint paper entitled 'All-Island Energy Market Development Framework'² setting out their commitment to establishing a single wholesale electricity market, and measures to ensure effective and coordinated regulation of the market. In order to give this effect, appropriate legislation is required in each jurisdiction – specifically, an "Order in Council"³ in the United Kingdom, and a "Parliamentary Act"⁴ in the Republic of Ireland – to establish the SEM, and provide for the creation of the SMO.

1.3. Obligations facing AIME

AIME's position in the market is explicitly defined in the T&SC, which sets out the rules, procedures, terms and conditions which all parties including AIME must adhere to in order to participate in the SEM. AIME will administer daily bid/offer capture, market scheduling and price determination. It will produce daily, weekly and monthly settlement and invoicing statements for electricity, constraints, capacity payments and AIME charges. In conjunction with this it will execute weekly and monthly clearing services for electricity, constraints, capacity incentives and AIME charges. SEM will be a fully collateralised market and AIME will manage market participants' credit requirements on a daily basis. AIME is charged with managing currency risk on behalf of market participants. AIME has a role in query, dispute resolution and market change administration and development. AIME undertakes these roles through the Modifications Committee and Disputes Resolution Board. Finally AIME will be involved in the provision of market information.

AIME is charged with responsibility for operating the SEM. Its key obligations under the legislation and T&SC include:

1.3.1. Operation of SEM

AIME will be responsible for market operations and this addresses both physical market processes, including capture of bids/offers and market scheduling activities, and market finance processes encompassing market settlement, invoicing, credit management, and management of market funds and treasury activities. It is crucial for the operation of a transparent, well-functioning electricity market that this activity occurs in an accurate and timely manner in each case.

The key objective facing the wholesale market operator during the coming regulatory period is for AIME to establish stable market operations.

1.3.2. Planning and Development of SEM

AIME will play a key role in delivering effective market rules change. AIME will actively support and assist the Modifications Committee to ensure its effective operation and will deliver the efficient implementation of any required change. AIME is engaged in this process as a member of the Modifications Committee. AIME will, along with other committee members, participate in the development and assessment of modification proposals. AIME also provides a secretariat to the Modifications Committee. This secretariat will ensure the execution of modification processes and procedures, management of documents, and the publication of rules and other information related to the modification processes.

² <http://www.allislandproject.org/allislanddevelopmentframework23-11-04.pdf>

³ <http://www.detini.gov.uk/cgi-bin/downutildoc?id=1779>

⁴ <http://www.dcmnr.gov.ie/NR/rdonlyres/1585F163-E3F3-4882-B2D2-D4AA81A8AC8A/0/SEMBill.pdf>

AIME will be obliged to prepare and submit to the Regulatory Authorities for approval, on a rolling basis, a plan for the development of the system over the following two years⁵. AIME will work closely with the industry, regulators and other stakeholders to assist in the development and effective functioning of a competitive market to ensure the SEM works with maximum efficiency, competitiveness and fairness, thereby enabling competition in the market to the ultimate benefit of consumers for years to come.

1.3.3. Providing All-Island Service Delivery

An important objective for AIME will be to establish the all-island identity of the market, creating a strong all-island brand and delivering impartial and seamless services, regardless of location of its customers or its own staff.

1.3.4. Procurement and Availability of Information Systems

The efficiency and availability of AIME market systems and infrastructure are key components for the success of both market operations and communications from/to all market players and will be crucial to develop and maintain stakeholder confidence. AIME IT infrastructure, including software and hardware, will involve two interchangeable and identical production environments located in Dublin and in Belfast. The duplication of AIME IT infrastructure will provide high availability of AIME software and hardware.

1.3.5. Information Publication

In order to facilitate market transparency, the accurate and timely publication of information is a crucial objective of AIME. Appendix 4 contains a details list of AIMEs current publication obligations as per T&SC v1.0.

1.4. Key assumptions

AIME has made a number of assumptions in preparing this submission. The key ones are described below.

- The details of this submission have been determined on an analysis of AIMEs requirements using T&SC v1.0, and the draft licences used for consultation⁶. For the purpose of this submission it has been assumed that there will be no additional responsibilities assigned to AIME;
- It is recognised that at the time of this submission the Market Operator Licences, MOA and T&SC have not been finalised and that any impacts resulting from changes to the draft versions will need to be treated appropriately at a later date;
- Where reference is made to the T&SC the version number is given first and then the section in that version that is being referenced, e.g. (T&SC v1.0 6.130) refers to version 1.0 of the Trading and Settlement Code, section 6.130 (Financial and Settlement – Credit Risk and Required Credit Cover);

⁵ <http://www.detini.gov.uk/cgi-bin/downutildoc?id=1779>

⁶ <http://www.allislandproject.org/2006/AIP-SEM-159-06.pdf>

- Where the recovery of the Imperfections Charge and Generator Testing Charge does not match actual cost the T&SC v1.0 refers to an SO Balancing Charge. In this paper, it is proposed that the balancing charge is treated as a balancing cost which will be funded by EirGrid and SONI as AIME;
- At the request of the RAs, this submission has assumed an 11 month tariff period. It has been assumed that the "Go Live" date for SEM will be November 1st 2007 and that the tariff control period will run until September 30th 2008. All actual and estimated expenditure has been provided on that basis;
- At the request of the RAs, all expenditure and tariffs are presented in Euro (€). Any money either collected or paid in GBP has been projected in GBP and then converted to Euros at a budgeted exchange rate;
- This submission is made in 2007 money terms unless otherwise stated;
- AIME will recover the costs and expenses of its activities from participants. Any over or under recovery of expenses for any given Revenue Submission shall be taken into account by the RAs in approving the budgeted revenues, costs, and expenses of the market operator for the following tariff period;⁷
- The Revenue submission will make no reference to the staffing impacts on the TSO businesses caused by the introduction of SEM, this will be addressed as part of the respective TSO Revenue Submissions;
- The SEM will be a fully collateralised market with participants required to post credit cover to cover 'all potential payment commitments in respect of the SEM over the settlement risk period' (T&SC v1.0 6.130) with AIME as the administrator of the market;
- AIME will receive a number of services from the parent organisations. The principle applied is that any cost incurred by EirGrid or SONI through their business that relates to AIME will be charged back to AIME;

1.5. Structure of Submission

This submission comprises 4 more chapters and a number of appendices.

Chapter 2 describes the SEM, the regulatory framework through which it has been delivered and it provides details of the proposed governance, operation and organisational structures of AIME.

Chapter 3 contains the detail of the expenditure that has been incurred to date in order to establish the SEM and forecasts of the expenditure that will be required on an ongoing basis. This data is supported by a spreadsheet and a number of Appendices that go into greater detail. A description of the capital expenditure on the project is contained in Appendix 2. Details of the imperfections forecast are contained in Appendix 5 in a separate submission prepared jointly by the System Operators for the AIME Revenue Submission.

Chapter 4 proposes a regulatory model for AIME based on an understanding of the risks and uncertainties that face AIME. A proposal for suitable incentivisation is included.

Chapter 5 details the tariffs that will be charged by AIME during this control period which are derived on the basis agreed in the Tariff Methodologies consultation.

⁷ TSC v1.0 2.59

2. Delivering the Single Electricity Market

2.1. Establishment of SEM

The Irish and UK governments are committed to furthering the integration of their regional electricity markets within the context of the EU drive to create an EU wide internal market. The SEM is designed to create a new single market for the wholesale trading of electricity, bringing together the two existing wholesale markets on the island of Ireland. The creation of the SEM flows from work underway since 1999 to enhance cooperation between Northern Ireland and the Republic of Ireland.

The Department of Communications, Marine and Natural Resources (DCMNR) in the Republic of Ireland and the Department of Enterprise, Trade and Investment (DETI) in Northern Ireland are working with the RAs, NIAER and the CER on the development of SEM.

This section describes the approach adopted by the Regulatory Authorities and government departments to deliver the SEM. It provides details of the proposed governance, operation and organisational structures of AIME.

2.2. SEM Overview

The SEM is designed to create a new single market for the wholesale trading of electricity, bringing together the two existing wholesale markets on the island. The SEM will enable generators and suppliers of electricity on the island to trade all their electricity on a daily basis regardless of their location on the island. This will be achieved through a mandatory gross pool, subject to market rules, procedures, terms and conditions set out by the T&SC and associated agreements. The SEM will encompass approximately 2.5 million electricity consumers⁸; 1.8 million in the Republic of Ireland and 0.7 million in Northern Ireland. It is expected that there will be approximately 75 participating units trading over 35.095 TWh of electricity in the period November 2007 to September 2008. There will be over 10,600 megawatts of installed generator capacity, of which in excess of 17% will be renewable, including 1,680 MW of wind generation⁹.

2.3. Regulatory Framework

The RAs have led the establishment of the SEM and have put a regulatory framework in place to support its establishment. The legal and regulatory structures for the SEM are illustrated in Figure 1.

In both jurisdictions the principal instruments by which the RAs regulate the Market Operator parties (i.e. the parties jointly responsible for operating the market – EirGrid and SONI) will be the licences granted under statutory powers. In the hierarchy of documentation, licences generally sit below legislative provisions. The licences set out the main areas of obligations on each licensee, with conditions placed to ensure the licensee's fulfil their roles and responsibilities to the SEM.

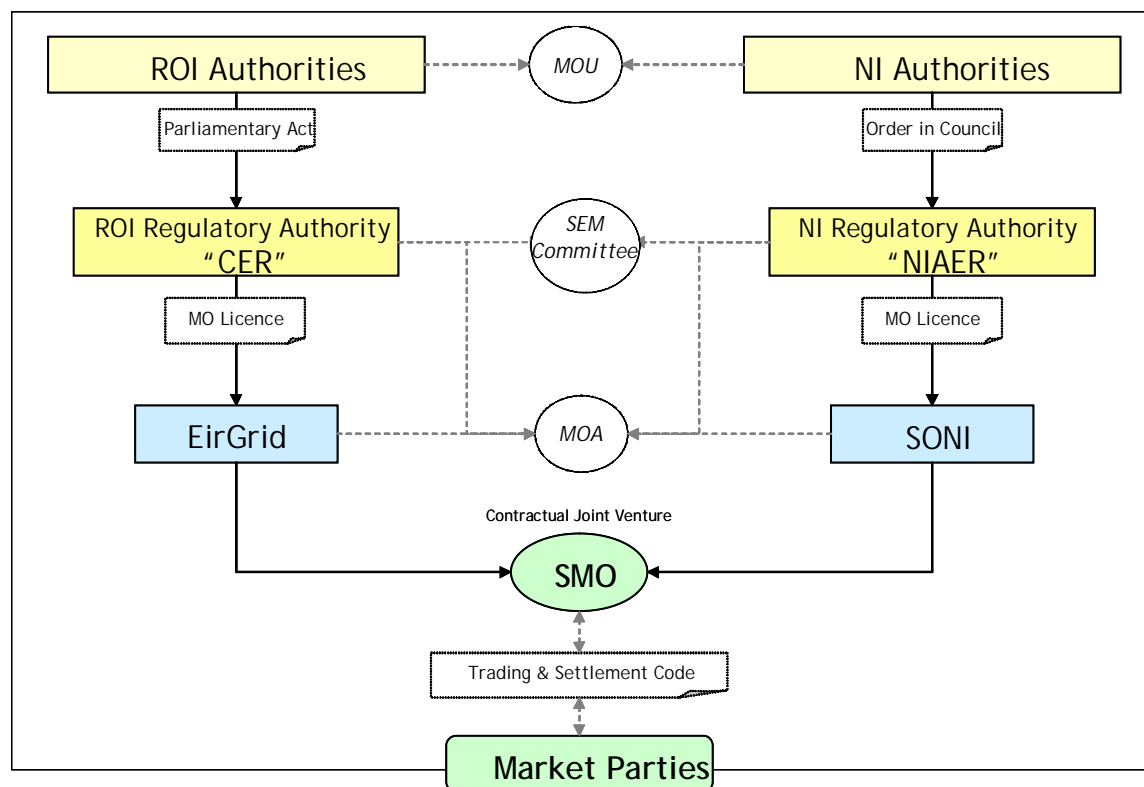
A SEM Committee will be established by both NIAER and CER. It is responsible for overseeing all market issues and developments, in both jurisdictions, from a regulatory perspective, and has the power to adjudicate, advise, and impose sanctions as necessary.

⁸ <http://www.allislandproject.org/AIP-SEM-06-05.pdf>

⁹ For further details see TSO constraints Submission Appendix 3

The Market Operator Agreement (MOA) will be an agreement by which EirGrid and SONI discharge their Market Operator obligations concerning AIME. Principle topics to be addressed include Governance & Resourcing, Operations, Financial Budgets & Procurement Management and Dispute Resolution for disputes between SONI and EirGrid acting as AIME.

Figure 1: SEM Regulatory Framework



The overarching document which underpins the SEM is the T&SC which sets out the rules, procedures, terms and conditions which parties must adhere to in order to participate in the SEM. The RAs are responsible for initial definition and drafting of the rules and setting out the provisions for the development and governance of the SEM. The T&SC places a significant number of obligations upon AIME, mainly encompassing Legal, Financial and Operational obligations. AIME also has obligations placed upon it in relation to developing the T&SC – both as Secretary to, and as a member of, the Modification Committee.

It is important to note that at the time of this submission the Market Operator Licences, MOA and T&SC are not finalised.

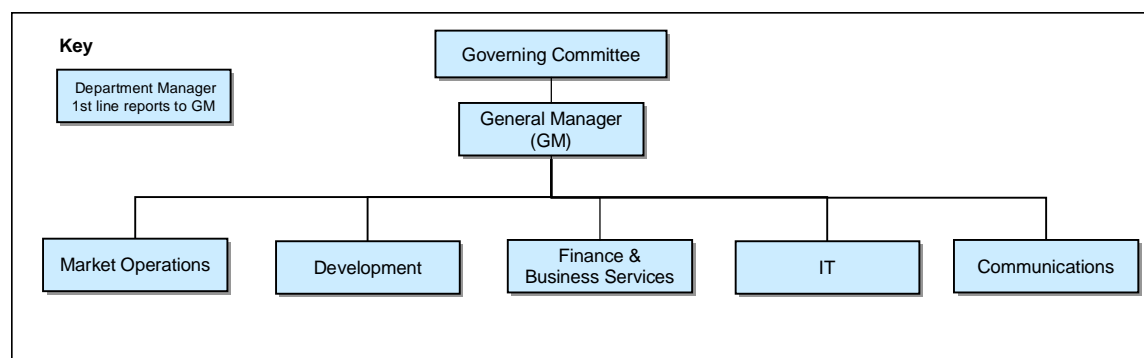
2.4. AIME Business

As stated earlier, AIMEs position in the market is explicitly defined in the T&SC, which sets out the rules, procedures, terms and conditions which AIME must adhere to. AIME will administer daily bid/offer capture, market scheduling and price determination. It will produce daily, weekly and monthly settlement and invoicing statements for electricity, constraints, capacity incentives and AIME charges. In conjunction with this it will execute weekly and monthly clearing services. AIME will ensure a fully collateralised market through the management of market participants' credit requirements on a daily basis. AIME is charged with managing currency costs and plays a role in market change administration, query, and dispute resolution. Finally AIME will be involved in the provision of market information.

2.5. AIME Governance

AIME is fully owned by SONI Limited and EirGrid Plc who have jointly established AIME as a contractual joint venture. The MOA will be the instrument which sets out its joint business and operational requirements. The AIME Governing Committee (GC) oversees the operation of the contractual joint venture and directs the business operation of AIME. The GC is comprised of an equal number of members from SONI and EirGrid. These members are appointed by both SONI and EirGrid. AIME will be managed by a General Manager who will receive direction and objectives from the GC, as illustrated in Figure 2.

Figure 2: AIME Management Structure



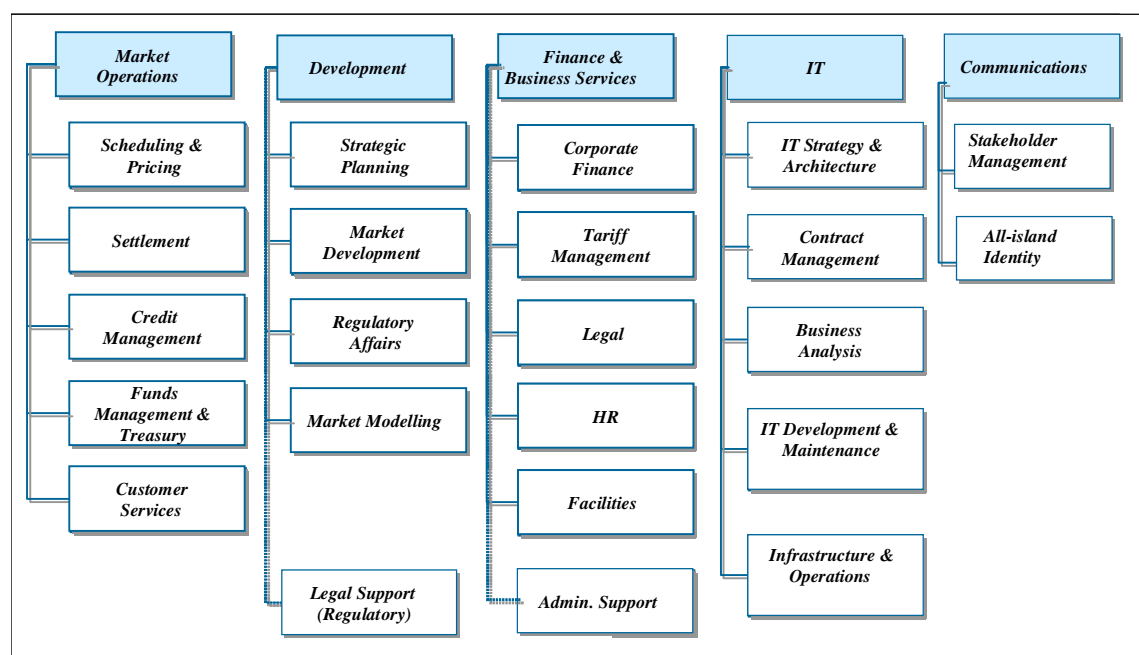
AIME, as illustrated above, is structured around five functions comprising Market Operations, Development, Finance & Business Services, IT, and Communications. The General Manager will appoint a manager for each AIME function, set their objectives, and provide direction in consultation with the Governing Committee. Each manager will be responsible for the day to day running of his or her function and achieving their objectives.

2.6. AIME Functions

Each function is structured around specific business processes and procedures, see Figure 3. This means there are clear and unambiguous responsibilities for each business function and process which is especially important where staff and functions are embedded in parent organisations, and potentially based in two locations.

Market Operations forms one organisational unit. This means one manager is responsible for “bid to bank” central market processes. Credit management and market funds management, as clear front-office responsibilities, are part of central market processes and are therefore structured under Market Operations. Development is clearly distinct, focussing on market evolution, both in terms of rules changes and AIME development, rather than day-to-day operations. The importance of IT is reflected by a separate function. This unit covers the full lifecycle of IT, from Strategy to Operations. It includes management of the Prime Contractor who plays an important role in developing and certifying market systems. All corporate support functions are grouped as one organisational unit, Finance and Business Services. The Finance function here is corporate/commercial, and therefore not focussed on T&SC. The figure below shows the structure of AIME and each functions unit, a detailed list of AIME activities is included in Appendix 3.

Figure 3: AIME Functions



2.6.1. Market Operations

AIME’s core business is to administer the wholesale electricity market. The Market Operations function is responsible for all the central market activities including market finance. This includes administering bid/offer capture and market scheduling. It further includes producing daily, weekly and monthly settlement and invoicing for electricity, constraints and capacity incentives, as well as AIME’s own charges. Market Operations will execute weekly and monthly clearing services for energy, constraints and capacity incentives and conduct credit management activities daily to ensure a fully collateralised market. Under the terms of the T&SC, AIME will be obliged to manage participant (de)registration and data maintenance. This will be facilitated under the Market Operations function through a Customer Service team. The Customer Service team will provide a single point of contact for all market participants interfacing with AIME.

2.6.2. Development

The Development function enables AIME to define and plan its key business objectives. It endows AIME with the ability to deliver its obligations under the T&SC. Development comprises the critical functions of strategic planning, market development and legal & regulatory support, which includes market modelling. This function provides support to the market rules modification process. AIME is engaged in this process through acting as a member of the Modifications Committee (T&SC v1.0, 2.86) and providing market modelling services. AIME will (along with other committee members) participate in the development and assessment of modification proposals. AIME also provides a secretariat to the Modifications Committee (T&SC v1.0, 2.89 – 2.90). This secretariat will ensure the execution of modification processes and procedures, management of documents, and the publication of rules and other information related to the modification processes. The Development function will also facilitate the Dispute Resolution Board. AIME is required to appoint and maintain a Dispute Resolution Board (DRB), which consists of suitable qualified members who are experienced in, and familiar with, alternative dispute resolution procedures which do not involve litigation; and/or have an understanding of the electricity industry or have the ability quickly to acquire such an understanding (T&SC v1.0, 2.289). The resolution of disputes will be managed in accordance with rules and procedures defined in the T&SC. Regulatory Affairs will manage the interface with the RAs, as well as any legislative legal issues associated with the T&SC, market operator licenses, and Market Operator Agreement.

2.6.3. Finance and Business Services

Corporate finance, legal, facilities, and HR are required to support the activities of AIME. These services will be covered by the Finance and Business Services function. This includes corporate finance to manage AIMEs corporate accounts and perform financial reporting. This function will perform AIMEs control framework management, managing working capital adequacy and funding arrangements.

2.6.4. Information Technology

The importance of IT to AIMEs business is reflected in it having its own functional unit. AIME requires IT services to develop and maintain the hardware and software systems required to support market operations. AIME operations activity will be highly systems dependant with applications to support the management of bids/offers, market scheduling runs, settlement, invoicing, credit management activities, market funds and treasury including the automatic transfer of funds to bank. There are also corporate applications to enable the finance function to implement a wide range of operations, including accounting, management of corporate Accounts Receivable/Payable, and procurement and to support AIMEs internal systems.

2.6.5. Communications

AIMEs communications function manages both external and internal audiences. Communications will facilitate the development of AIMEs operations through a process of engagement with participants to ensure their expectations are being met by AIME and to better understand their requirements of the business. Further it will ensure compliance with AIMEs publication obligations under the T&SC (Section 3.12-3.20) while providing transparency around market events and AIME decisions, and facilitate market activity and participants' operations. Communications will be involved building the all-island identity of AIME through the website and publications.

3. SEM Expenditure

3.1. Introduction

SEM Expenditure covers all the costs incurred by, or recovered through, AIME in developing, establishing, and operating the SEM in order to comply with the terms of the legislation, Market Operator Licences and T&SC. There are three aspects to this expenditure, capital expenditure, operating expenditure and imperfections expenditure.

The capital expenditure that will be recovered by AIME includes the costs incurred by EirGrid and SONI in establishing the SEM on behalf of the RAs that are to be recovered through AIME¹⁰, the costs incurred by EirGrid and SONI in establishing AIME and running AIME before 'Go-Live' for the purpose of Market Trial and the a programme of capital expenditure incurred over the course of this regulatory price control period. AIME operating costs comprise AIME operating costs incurred after November 1st 2007 and the depreciation of AIMEs capital expenditure. Imperfections expenditure is treated separately to AIME capital and operating expenditure as it is not a cost within the control of AIME.

The TSOs are responsible for forecasting and controlling imperfections and a submission will be made by them, separate to AIME revenue submission, which will deal with imperfections and the balancing cost. The TSO submission is included as an appendix to this document (Appendix 5 – Imperfections). However, AIME is deemed to administer imperfections charging and payments under the T&SC (T&SC v1.0, 4.126). This is to allow imperfections recovery on an all-island basis and is consistent with the high level market design¹¹.

3.2. Capital Expenditure

Capital expenditures are made up of a number of elements. These are the project implementation costs incurred by EirGrid and SONI in establishing the SEM that are to be recovered through AIME tariff (both SEM Programme and SMO Establishment), costs associated with AIME market trial, and capital expenditure incurred over the course of this regulatory price control period. The analysis underpinning all of these costs can be found in the supporting Excel File¹².

Table 6 SEM Capital Expenditure

SEM Capital Expenditure (€000s)	
SEM Programme	42,609
SMO Establishment	8,070
AIME Market Trial (pre Go-Live)	3,783
Year One Capital Programme	0
Total	54,462

In developing our capital cost estimates we have assumed:

¹⁰ The TSO readiness expenditures are recovered through the parent organisations jurisdictionally and therefore not discussed here

¹¹ AIP/SEM/42/05

¹² See supporting information included with this submission in Revenue Submission Supplementary v1.0.xls

- Project costs attributable to AIME will be capitalised and recovered through AIME tariffs. The RA approved budget figures from the AIP are used where appropriate, otherwise the current estimate is given;
- Spending for the project has been incurred on a phased basis with approved expenditure included up to February 2007. The project is currently in phase 3. All numbers used in this section are in mid-2007 terms;
- The cost of the 4 month delay has been included as a project cost¹³.

3.2.1. SEM Programme Expenditure

The objective of the SEM Programme is to ensure the smooth implementation of the market systems and processes required for operation of the SEM. The SEM Programme expenditure relates to the costs involved in the analysis, design, specification, procurement and implementation of market systems. This expenditure has been incurred on a phased basis with oversight and approval of all costs conducted by the RAs. This expenditure has been incurred by EirGrid and SONI to a 75/25 split agreed in the MOA. Both Programme Wide and Rules & Modelling expenditure spans the SEM Programme and SMO Establishment. The Programme Wide expenditure covers activity related to inter-project coordination, project governance and some professional fees relating to the client side advisor. Rules expenditure covers AIMEs contribution to market rules development forums. Market modelling expenditure is a continuation of existing work to model the cost/benefit impacts of the SEM and provide input to various market rules workstreams, such as capacity payments, uplift and imperfections. A more detailed description of SEM Programme Expenditure can be found in Appendix 2.

Table 7 SEM Programme Capital Expenditure

SEM Programme Capital Expenditure (€000s)	
Total	42,609

3.2.2. SMO Establishment Expenditure

The objective of the SMO Establishment Project is to ensure that a Market Operator organisation is established, and operationally ready, in time for commencement of the Market Trial. Establishing AIME has significant legal, contractual, system and process impacts for SONI and EirGrid. Implementing this change requires a large number of activities to be undertaken, with contributions from a wide range of personnel. The establishment of AIME involves the procurement of numerous IT systems to enable its operation. Requirements for these systems have been identified as part of SEM Establishment Programme. A detailed description of SMO Establishment Expenditure can be found in Appendix 2.

Table 8 SMO Establishment Capital Expenditure

SMO Establishment Capital Expenditure (€000s)	
Total	8,070

¹³ <http://www.allislandproject.org/2006/AIP-SEM-103-06.pdf>

3.2.3. AIME Market Trial

A number of AIME costs will be incurred before the expected 'go-live' date of November 1st 2007. These are required to ensure AIME organisation is operational during Market Trial. Market Trial is the penultimate project step ensuring that the people, processes and systems are operationally ready for market opening. Market Trial spending includes payroll, IT, facilities, professional fees and G&A.

AIME will require 57 staff (see section 3.3.1 for detail) to be employed by the parents in order to be operational in time for market trial in July. Payroll costs have been determined on the basis of a phased ramping up of numbers from October 2006 reflecting the increasing workload associated with delivering a number of activities. This will allow AIME to be operationally ready in time for market trial in July, although it will not reach the full complement of 57 staff until October. These AIME staff will be engaged initially in operational readiness tasks, then in executing the market trial, and the provision of any live services that commence prior to Go-live

Provision has been made for IT costs which represent the cost of setting up users on the AIME corporate IT and telecoms systems. This includes networks costs and systems licences such as those required for PC operating systems and other software, as well as expected telecoms costs.

Facilities expenditure represents the cost of office space required by AIME to be operational during the market trial. It includes office rent in Dublin and Belfast, and associated facilities costs such as heating, insurance, security, mail room, canteen, from April 2007 as AIME will become operational for the purpose of market trial. All facilities costs prior to April are considered project costs and are captured in the SEM Programme and SMO Establishment expenditure.

Professional fees comprise staff recruitment costs and the development of the AIME website. The cost of hiring new staff sourced competitively from the market is included. In order to fulfil the many information publication obligations conferred on AIME through the T&SC, ensuring that AIME's internet portal is appropriate for a market operator business as well as providing features for participants that reflect their requirements, considerable spend will be required. Details of a number of AIME's publication responsibilities, as per T&SC v1.0, are in Appendix 4.

There will also be additional business overheads associated with AIME start up including the design and order of stationery and letterheads that incorporate AIME branding. The G&A provision is for these costs as well as travel and subsistence allowances which are expected to be considerable during this period.

Table 9 AIME Market Trial Capital Expenditure

AIME Market Trial (€000s)	
Total	3,783

3.2.4. Year 1 Capital Programme

In addition to the capital expenditure incurred by EirGrid and SONI in the establishment of the SEM and AIME, the development of the SEM and T&SC will require pre-planned and ad-hoc upgrades to market systems. Two programmes of work are presently anticipated within the first year post Go-Live.

The first programme will be the first controlled release of changes to the market systems. It will cover critical changes that need to be delivered shortly after Market Trial. The second programme will be the second controlled release for which it is expected that a number of change requests, some of which have presently been deferred in the change control process, and others which can be expected to arise in the next few months, will be delivered. These will be grouped together in a formal release which is nominally targeted for around six months post Go-Live.

As it is not possible to estimate costs or staff numbers for these programmes at this stage, therefore the Year 1 Capital Programme will not be dealt with in this Revenue Submission. A separate submission will be made by AIME on these programmes. It is expected that a project team will be established to implement these two projects. This is expected to be similar in structure to the current implementation project, but on a smaller scale.

3.2.5. SEM Implementation Cost Recovery

SEM implementation refers to all capital expenditure discussed above (SEM Programme, SMO Establishment, and AIME Market Trial). With regard to an appropriate period of cost recovery a reasonable degree of prudence is required. Where IT systems are implemented, it is appropriate that depreciation of these costs reflects the duration of systems. Typically these costs are recovered over a 5 year period. The assets that EirGrid and SONI are investing in order to establish the SEM and AIME should not be confused with their useful life. While the draft legislation states that the new market can be reasonably expected to have a life of 10 years, the systems that underpin them will be extensively modified and overhauled over that period. A five year recovery period is consistent with current depreciation rules applied by the parent companies and international practice. Both BETTA¹⁴ and NEMMCO¹⁵ market implementation costs were depreciated and recovered over a 5 year time frame. In the US, ISO NE¹⁶ and CAISO¹⁷ depreciation is conducted using straight-line methods over an estimated useful asset life ranging from three years to five years for IT systems.

While the period of recovery will ultimately be assessed in light of the potential impact on both the parent companies making the investment and electricity consumers, AIME believes a 5 year depreciation period is appropriate.

¹⁴ http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/3936_Costrecoveryresponse_conclusionsdoc.pdf?wtfom=/ofgem/whats-new/archive.jsp

¹⁵ <http://www.nemmco.com.au/nemgeneral/000-0177.pdf>

¹⁶ http://www.iso-ne.com/aboutiso/fin/annl_reports/2000/2004_annual_report.pdf

¹⁷ <http://www.caiso.com/docs/2005/07/20/2005072016553817629.pdf>

3.3. Operating Expenditure

AMIE operating expenditure covers all costs that incurred by AIME from ‘go-live’, in order to operate the SEM. In this section we describe how AIME has arrived at its indicative estimates of the operating costs of the market operator business over the period November 2007 to September 2008. The analysis underpinning all of these costs can be found in the supporting Excel file¹⁸.

Table 10 AIME Operating Expenditure

Operating Expenditure (€000s)	
Payroll	5,395
Professional Fees	1,200
Facilities	1,247
IT & Communication	2,377
Research & Development	250
Depreciation	9,985
Currency	0
General & Admin	497
Working Capital	0
Total	20,951

In developing our operating cost estimate we have assumed that:

- The Revenue Submission period covers 11 months from "Go Live" which is taken as 1st November 2007;
- All amounts either collected or paid in GBP will be budgeted in GBP and then converted to Euros at a budgeted exchange rate;
- No provision has been made for a Regulatory Levy, Market Monitoring Unit or any other costs that might be incurred by the RAs and recovered on an all island basis;
- The Revenue submission does not include the staffing impacts on the TSO businesses caused by the introduction of SEM;

3.3.1. Payroll

AIME estimates that €5.395m will be required in payroll costs based on 57 operational full time equivalents. This includes all management, specialist and support staff. The key driver of this cost is the design of SEM which requires a number of staff to work on a 7 day basis with additional on-call support. AIME believes that the staff numbers proposed are conservative given the obligations it carries under the legislation, its market operator licences, and the T&SC.

It should be noted that while there are differences between the average cost per employee in AIME and EirGrid and SONI TSOs the costs are broadly consistent with those previously agreed for the TSOs. The average cost per employee for AIME is marginally lower than that of its parent organisations. This is predominately due to the highly specialist nature of power system operations and planning and the difficulty the TSOs have in sourcing these staff domestically.

¹⁸ See supporting information included with this submission in Revenue Submission Supplementary v1.0.xls

As stated in Section 2.6, AIME will comprise of 5 functions. Table 11 below describes the staffing numbers by function, these are:

- Market Operations with responsibility for all “bid to bank” central market processes;
- Development, which is focused on market evolution, and AIME development, rather than day-to-day operations;
- IT covers all aspects IT and relates to the administration and management of IT hardware and software. It also includes management of the Prime Contractor and contracts maintenance;
- All corporate support functions are grouped in Finance and Business Services;
- Communications which is focused on stakeholder management and creating an all-island identity.
- The General Manager and 4 administrative assistants have been divided evenly among each section and are included in the numbers below.

Table 11 AIME Staff Numbers by Function

Function	Staff Numbers
<p>Market Operations</p> <p>The Market Operations department includes the following areas:</p> <p>Scheduling and Pricing will include management of receipt of bids and offers and determination of market schedules and prices As the market operates 7 days a week these staff will work on the same basis. The staff complement needs to cover the necessary rotation to cover 7 day working, leave and sickness.</p> <p>Settlement includes all activities related to market settlement and invoicing including the management of settlement reallocation, some on-call availability outside normal business hours is required. These staff must oversee and manage 4 settlement runs for every settlement day (indicative, initial, 4 month resettlement, 13 month resettlement). Each of these runs could lead to queries from market participants, and, in principle, to disputes; the settlement team will need to be able to support resolution of all queries and disputes. The settlement process also leads to the production of invoices and credit notes, as appropriate, for all participants: these are produced weekly for energy and monthly for capacity. The settlement team must be able to deal with peak workloads which follow bank holidays (for example, after the Easter weekend).</p> <p>Funds Management includes managing receivables and payables for the market. These processes include tight timescales for collecting payments from Suppliers and making payments to Generators. Adherence to these timescales will be seen as very important, particularly by Generators. The timescales envisaged leave little leeway: the staffing complement here must be adequate to deal with the routine process and also tasks that follow failure by a participant to pay on time (including scaling back of payments to Generators)</p> <p>Credit Management includes all the tasks necessary to assess the exposure of individual participants, and calculate and request the appropriate collateral. It is envisaged that the credit check calculation will be run daily. This team will deal with instances where adequate collateral is not made available (that is, a credit default).</p> <p>Customer Services will be the principal point of contact for parties and others to AIME. This service will be provided for extended working hours and will need to be staffed accordingly. It is envisaged that there will be service standards defining how quickly enquiries must be dealt with.</p>	<p>21.8</p>
<p>Development</p>	<p>9.8</p>

<p>This area is responsible for the development and support of both the T&SC and for the strategic development of AIME itself.</p> <p>This department will support the Modifications process which will deal with proposed changes to the Trading and Settlement Code. It is likely that this process will need to be completed within a timescale defined for each Modification.</p> <p>The Development team includes regulatory affairs personnel, and a market modelling group who will develop and operate market models, and investigate features and impacts of various market rule changes</p>	
<p>Finance & Business Services</p> <p>The Finance team will manage AIME business finances and accounts, and oversee the effective implementation of procurement policy. The Business Services function will coordinate the implementation of the support functions which include HR, legal and facilities.</p>	7.8
<p>IT</p> <p>The IT Department is responsible for all the services necessary to provide, operate, and maintain AIME's systems (including central market systems and AIME business systems).</p> <p>This encompasses:</p> <ul style="list-style-type: none"> § Setting the strategy and IT architecture § Managing vendors § Defining requirements § Implementation and delivery of systems § Maintenance of systems § Provision and operation of infrastructure <p>Some of this function will be required 7 days a week support operation of the SEM.</p>	15.8
<p>Communications</p> <p>The communications will be responsible for all aspects of public relationships management. During the first year the Communication Function will mainly focus on building the AIME brand, stakeholder management developing the stakeholder confidence, and creating a common culture for AIME staff.</p>	1.8
<p>Total</p>	57

3.3.2. Professional Fees

AIME estimates that €1.2m will be required in professional fees based on expected workload over the period November 1st 2007 to September 30th 2008. No provision is made here for professional fees relating to capital programmes post ‘Go-Live’. All this expenditure will be submitted on separately (See section 3.2.4).

Table 12 AIME Professional Fees Expenditure

Professional Fees (€000s)	
Regulatory Legal	250
Committees	335
Consultancy Services/Contractors	225
Market Auditor	260
Regulatory levy	0
Other	130
Total	1,200

Regulatory Legal

AIME will require legal advice on regulatory issues arising from AIME Licences, and T&SC. This advice will vary from providing legal input regarding the implications of changes to the T&SC to providing interpretation of AIMEs responsibilities under the T&SC and Licences. Regulatory Legal will provided support to AIME in the Dispute Resolution Process.

Committees

As part of its obligations AIME must support two committees, the Modifications Committee and Dispute Resolution Board. The Modification Committee is the principle body responsible for processing changes to the T&SC. According to the T&SC it shall be composed of not less then 13 members and not more than 17. Further AIME is responsible for providing a full time secretariat. The T&SC allows for these costs, as well all other costs and expenses of the Modifications Committee to be recovered through AIMEs tariffs (T&SC v1.0 2.123).

Apart from the Modifications Committee AIME will facilitate the Dispute Resolution Board. AIME is required to appoint and maintain a Dispute Resolution Board (DRB), which consists of suitable qualified members who are experienced in, and familiar with, alternative dispute resolution procedures which do not involve litigation; and/or have an understanding of the electricity industry or have the ability quickly to acquire such an understanding. The TS&C deems AIME liable for all the costs associated with settlement disputes (T&SC v1.0 2.211).

Consultancy Services/Contractors

A nominal provision is proposed for the use of outside contractors to ensure business continuity during this regulatory period. The allowance sought is to provide a framework for this kind of a requirement, however, it should be noted there may be further incremental requirement that AIME seeks pass through on. AIME believes this is prudent as a new business unit in a market that is untested at the time of this submission and this principle is consistent with current regulatory practice.

Market Auditor

Under the terms of the T&SC, the Regulatory Authorities are expected to appoint a Market Auditor every 3 years. The purpose of the Market Auditor is to conduct an audit of the code and its operations, procedures and processes at least once every calendar year. It is expected that this will only happen once over the course of this revenue submission period. The TS&C provides for AIME to recover the costs of the Market Auditor (T&SC v1.0 2.75) and the provision sought is consistent with previous TSO requirements.

Regulatory Levy

No provision has been made for a regulatory levy, or licence fee, after discussions with the RAs. However, in the event that a regulatory levy is incurred by AIME it is expected that this will be treated as pass through.

Other

Other professional fees include a requirement for corporate audit, recruitment and communications expenditure. AIME will have a requirement to ensure that both parents are properly meeting their financial obligations so provision has been made for corporate audit activity.

AIME expects relatively little staff turnover during the first 11 months of operation and is planning to be fully operational during market trial. Provision has been made for these costs in the Market Trial section so there will only be a nominal requirement for the recruitment of new staff that may be required as a result of normal staff turnover.

Communications includes expenditure relating to publications, such as the market development plan and other important AIME specific communications publications. As a customer focused business providing an interface for the wholesale electricity market, good relations with market participants, their agents, the regulatory authorities and government are critical to our success. In order to measure the views of these stakeholders AIME will conduct an annual stakeholder survey regarding AIME's performance. This will assist the internal development of AIME to ensure it meets participants' expectations and requirements.

3.3.3. Facilities

As AIME will be co-located on property provided by both parents for the period covered by this revenue submission and provision has been made by AIME for this. Facilities costs cover all shared space and include cleaning services, maintenance, car parking, security, mail service, copy bureau, switch board and catering and canteen services as well as the more obvious rent, insurance and utilities. EirGrid premises will relocate during the period covered by this Revenue Submission and this has an impact on AIME facilities charge resulting in an increase in the annual charge.

Table 13 AIME Facilities Expenditure

Facilities (€000s)	
Total	1,247

3.3.4. IT and Telecommunications

This category covers the support and maintenance of AIME IT and Telecoms infrastructure expenditure. All market software and hardware provided by ABB, Bearing Point, and Axapta have an extended support agreement and an operational support and maintenance agreement. These cover upgrades to the software, some helpdesk costs and third party hardware. This will ensure AIME can build internal expertise on the software without the market or participant's service being affected during the first 11 months of SEM.

The SEM infrastructure will involve two interchangeable and identical production environments. The first environment will be located in Dublin and the second will be located in Belfast with fail over provided by each site (T&SC v1.0 Section 3). This will ensure that the market scheduling and settlement platforms are available to five nines (i.e. 99.999% availability).

AIME's diverse IT infrastructure is facilitated by two high bandwidth 34 Mbit links between Dublin and Belfast. There will be a link to ABB to facilitate their helpdesk and 10 Mbit internet link into the parent organisations. All these links are leased from a major telecoms provider to ensure high availability and are supported by a service level agreement for maintenance and repair.

Table 14 AIME IT & Telecommunications Expenditure

IT & Telecommunications (€000s)	
Information Technology	1,396
Telecommunications	381
Total	2,377

3.3.5. Currency

The SEM will be a dual currency market. The market operator charges are levied on participants in both jurisdictions. AIME expenditure will be in both currencies as it will have operations (i.e. office, staff) in both jurisdictions. There will be differences in money received to money paid out and some funding may be required to ensure revenue adequacy. It is expected that all costs associated with this will be recoverable.

AIME will have a currency requirement for its operating and imperfections expenditure. These costs will be captured through the recovery mechanism agreed for each cost in the Tariff Methodology paper. Based on AIME's analysis no provision is required in this Revenue Submission period. If provision is required AIME will use working capital to fund any short fall and seeks cost pass through for this, with any benefit returned to participants in the following tariff period.

It should be noted that AIME recognises that its own costs will be subject to different inflationary pressures in each currency zone and that this will be dealt with appropriately for the purpose of outturns and forecasts in subsequent Revenue Submissions.

Table 15 AIME Currency Requirement

Currency (€000s)	
Total	0

3.3.6. Cash-flow imbalance

AIME will require some provision of working capital from both parent organisations. This contingency will fund temporary imbalances in operating costs, and constraints. Further contingency may be required arising from the approach to the application of loss factors in SEM. As it will be required for a number of line items it will be explained further in Section 4.

3.3.7. Research & Development

The development of SEM will be directly driven by changes to market rules and/or regulations. While this will be outside the control of AIME, some products required for the evolution of the SEM in its first few years of operation may be posited based on the experience of other markets.

A likely requirement is for the development of over the counter (OTC) derivatives. These are primarily used as a risk management tool for Suppliers and Generators, in electricity markets. They are generally a bi-lateral contract in which two parties agree on how a particular trade or agreement is to be settled in the future. For derivatives, these agreements are usually governed by an International Swaps and Derivatives Association (ISDA) Master Agreement framework. Trading of derivatives by “natural” participants attracts “traders” to the market, increasing the markets liquidity. A liquid OTC market may in turn justify the creation of a futures market.

The provision of trade execution services to facilitate a market in futures and other derivatives for electricity is another area which AIME would seek to develop. AIME has a natural benefit in providing such a market for electricity as it can ensure tight integration with spot market operations. There is a long-term benefit from such a market in improving liquidity and participant price risk management, though experience from many other parts of the world indicates that bilateral and over-the-counter trading first need to gain some maturity before futures takes off. Examples of markets that provide these types of product include Nord Pool, European Energy Exchange (EEX) and Powernext which all operate electricity futures and spot (in most cases, actually day-ahead) markets.

Another possibility exists to extend the range of market information services beyond the publication of data required by the market rules, to include wider data sources (e.g. archival data), data aggregation (e.g. merging and comparing data across multiple markets) and data analysis tools.

Table 16 Research & Development Expenditure

Research & Development (€000s)	
OTC Products	75
Futures Market	75
Information Services	100
Total	250

3.3.8. General & Administrative

This category covers the remaining expenses expected to be incurred operating the AIME business. It includes Travel & Subsistence, Office Supplies, Bank Charges and Staff Training.

Table 17 General & Administrative Expenditure

General & Administrative (€000s)	
Travel & Subsistence	247
Staff Training	95
Bank Charges	115
Office Supplies	40
Total	497

Travel & Subsistence

AIME will be based in Dublin and Belfast with participants located in two separate jurisdiction. This bi-locational nature will generate a requirement for travel. Where possible AIME will utilise conference calling to ensure that travel and subsistence costs are kept to a minimum though this may not be suitable for all purposes. Where possible, procedures and processes have also been grouped in the same location to further minimise the need for travel. However, it is expected that management will divide their time between Dublin and Belfast to ensure that the AIME delivers its services seamlessly in both jurisdictions, as required by the draft licences.

Staff Training

Provision of staff training is crucial to ensure staff have the requisite knowledge to enable the smooth operation of SEM. Staff training provision includes:

- On the job training for specific functional areas and introductory briefings by AIME managers;
- Production and maintenance of internal training materials.

Bank Charges

This covers the cost of banking and money transfer charges for market transactions. It does not include an interest charge for overdraft on this account. A nominal provision has been made for currency transaction charges here, but not any currency shortfall that results from cashflow imbalances (See 3.3.5)

Office Supplies

This is a requirement for stationery, letterheads, business cards and other office supplies that is expected to be incurred by AIME over the course of the year.

3.3.9. Depreciation

As discussed in section 3.2.5, AIME proposes that the most reasonable recovery period for its capital expenditure is 5 years. On this basis AIME proposes to recover the following amounts during this 11 month tariff period:

Table 18 SEM Depreciation Cost

Depreciation (€000s)	
SEM Programme	7,811
SMO Establishment	1,480
AIME Market Trial	694
Year One Programme	0
Total	9,985

4. Regulatory Model

4.1. Introduction

The regulatory model that AIME proposes for this tariff period is based on: full recovery of actual operating costs; full recovery of capital expenditure costs, depreciated over a 5 year period; full recovery of imperfections costs and the working capital funding costs associated with this; full recovery of any currency fluctuations and a form of incentivisation. AIME proposes this type of approach as it believes that it has been successful elsewhere, in that it allows regulated businesses sufficient funding to conduct their operations whilst at the same time minimising costs to consumers. Since there is a long time lag between the date of this submission and market go-live, there are a number of uncertainties which are essentially very difficult to predict at this stage. In order to deal with this AIME will be required to source financing to ensure it has no cash flow difficulties.

4.2. Revenue Requirement Contingency

In Section 3, AIME provided the best estimates for its expenditure that are available at this time. However it is important to recognise that this Revenue Submission occurs long before a number of key dependencies have been finalised. The Regulatory Framework, which includes the Legislation, Market Operator Licences and T&SC, is therefore subject to revision. AIME faces other challenges relating to currency issues and ex-ante tariffs that require provision to be made for financing. Finally, the treatment of losses in SEM could mean AIME incurs market related costs that have not been calculated. These are examined in this section.

Regulatory Framework

At the time of this submission a number of crucial legal and regulatory documents are not finalised, specifically the T&SC. While this is less than ideal, AIME accepts that it was to avoid any additional undue delay in delivering the SEM. However, AIME design, functional specification and resource levels may potentially be inadequate despite the best efforts of AIME to deliver a properly resourced business.

While AIME has made a small provision for consultants and contractors it is difficult to forecast what the ultimate requirement on the business will be in the absence of the final regulatory framework. In the event that additional responsibilities are placed on AIME beyond those outlined in the draft framework AIME seeks pass through on the resultant expenditure.

Currency

The SEM will be a dual currency market. The market operator charges are levied on participants in both jurisdictions. AIME expenditure will be in both currencies as it will have operations (i.e. office, staff) in both jurisdictions. There will be differences in money received to money paid out and some funding may be required to ensure revenue adequacy.

Tariffs

Tariff charges levied on participants in the SEM will be determined ex ante through AIME Revenue Submission Process. These charges require forecasts based on a number of parameters which will be dynamic in nature. There will be differences in money received to money paid out and some funding may be required to ensure revenue adequacy.

Loss Factors

Due to the implementation of loss factors energy receipts from suppliers may not equal energy payments to generators for energy. It is presently expected that any imbalances will be a Balancing Costs which will be funded by AIME.

4.2.1. Contingency

There will be a working capital requirement such that expected fluctuations over the Revenue Submission period can be managed effectively by AIME. This will ensure that sufficient liquidity is available to meet day-to-day cash flow obligations of the business. As outlined in the Tariff Methodologies paper, AIME will use financing provided by the parents to fund these temporary cash flow imbalances. This will be provided by EirGrid and SONI on a consistent basis with agreed split as set out in the MOA.

AIME expects that any funding provided by the parents is paid back with each parent's WACC applied to the provided sums. This is consistent with current regulatory practice. Any necessary adjustments will be treated as pass through.

It should be noted that forecasting imperfections for the SEM also presents a challenge. The SEM is a new market design, which is untested and for which no historical data or benchmarks exist. These variables make forecasting imperfections accurately difficult and necessitate a contingency, the Balancing Cost. This will be discussed in Appendix 5 as part of the TSO submission on imperfections.

4.3. Regulatory Incentives

The form or forms of regulatory control and incentivisation are a key element in any business subject to regulatory price controls. For an incentive mechanism to be effective it is of utmost importance that the form of control introduced recognises the structure and environment within which the business operates. A number of different approaches to regulation have been introduced internationally. While approaches vary, it is generally recognised that the introduction of financial incentives, which appropriately proportion efficiency gains between the customer, industry players and the regulated entity, are a more effective and efficient option than more intrusive regulation.

Incentive regulation is typically understood as a regulation approach which does not relate revenues/prices rigidly with costs, but allows efficient companies a higher rate of return and inefficient companies a lower rate of return. The intention is to reduce the undesired effects of a monopoly structure. A number of approaches have been adopted domestically and internationally such as rate of return, RPI – X (this is also referred to as CPI – X) and yardstick regulation to mention a few. Broadly these approaches focus on reducing input costs, or benchmarking performance against an entity's peers, to achieve efficiencies to be passed on ultimately to the end customer. Incentive mechanisms can be set based on the following criteria:

- Ability for the incentivised party to respond to the mechanism effectively and in a timely manner
- Ability to provide 'best estimates' for costs which are forecasted up to 12 months in advance.

AIME believes that incentive based regulation has proven to be successful in introducing efficiencies within its parent organisations, and should be introduced as soon as is practicable. However, at this stage of a new market design, with a number of key regulatory documents outstanding, AIME proposes a more pragmatic approach to incentivisation would be improve to AIMEs performance and deliver greater benefits to participants and electricity consumers.

4.4. AIME Proposal

In Section 4.2 AIME outlined a number of areas that highlight the difficult environment in which AIME would be incentivised in. We propose that incentivisation for this revenue submission should be based on improving AIMEs performance in relation to its T&SC obligations, to improve the product provided to our customers. Further incentives, for example around AIMEs operating costs, are more appropriately introduced in a gradual, controlled manner as the key uncertainties become reduced (as the market is bedded down), costs can be forecast in a well structured manner, and AIME achieves real control over the primary drivers behind such costs. It is also important to be able to measure the extent to which the performance of AIME meets these and other objectives. It is expected that these will become clearer over the course of this Revenue Submission period.

4.4.1. T&SC Performance Criteria

AIME would not be averse to performance incentives against its outputs and is open to discussing this further with the RAs. It is noted that under the terms of the draft Market Operator Licences, the Licensees are required to develop a set of performance criteria. AIME intends to make a separate submission to a timetable agreed with the RAs, to ensure that the appropriate incentive measures are in place for 'Go-Live'.

4.4.2. AIME Operational Expenditure

AIME believes that while incentivisation of its own operational costs may be desirable, it should not be at the expense of its performance in relation to AIMEs obligations under the T&SC (See Appendix 3 for a list of activity required of AIME by the T&SC). This is pertinent as small reductions in operating costs may reduce AIMEs ability to deliver the challenging obligations it faces and the impact of this could be much higher than the benefit of marginally reduced operating expenditure. Further, we believe that at this time it is not possible to readily establish a definitive baseline for the operational costs of AIME. The primary reason for this is that the scope of activities of AIME is not finalised. Secondly there is considerable uncertainty as to the operation of SEM given market trial has not begun. However over the course of this period, as costs and resources become more certain, AIME will examine this issue to establish if incentivisation of these costs is possible for the 2008-2009 Revenue Submission period.

4.5. AIME Return

AIME believes that its tariffs should cover its reasonably incurred costs with fair remuneration for shareholders/parents. The approach to date adopted by Regulators in both jurisdictions with respect to the TSOs has been to allow a return on their investment, by on applying their Weighted Average Cost of Capital (WACC) to their Regulatory Asset Base (RAB), calculated on a monthly basis. Both parents have invested substantial capital in AIME in order to deliver the SEM for the RAs.

The WACC for an organisation is determined by looking at the mix of debt and equity and the relative cost of each. The cost of debt is easier to define, by looking at current borrowing costs. The cost of equity is more difficult to estimate and is usually higher than the cost of debt as equity providers look for a higher return for their investment. With this in mind it is difficult to see how one WACC would suit AIME as the funding for the investment is coming from two different jurisdictions with different costs of borrowing and different costs of equity.

AIME proposes to use two separate WACCs. This will result in EirGrid and SONI receiving a return on their RAB relating to SEM which accurately reflects the cost of providing that investment. It should be noted that the approach being recommended is to have a separate historically agreed WACC for EirGrid and SONI.

Based on current capital expenditure of €5.462m it is expected that AIME would recover €2.672m in the 11 month control period by way of return for the parent companies¹⁹.

¹⁹ €2.672m is derived from the historically agreed WACCs for EirGrid and SONI. The real post-tax WACC for SONI is 4.83% and for EirGrid is 4.92%.

5. Tariffs

5.1. Introduction

There is a suite of market operator tariffs designed to recover AIME costs. The proposed methodology has been presented to the industry in an earlier paper, SEM Tariff Charges Methodology, published on 24 November 2006 and consulted upon with the industry. This chapter proposes how cost allocation should be conducted and presents the resultant tariffs.

5.2. Cost Allocation

Cost allocation is an important aspect of tariff design that was discussed in the Tariff Methodologies paper. At the time there was a lack of clarity around costs which made the task of assigning them to particular tariffs difficult. This was noted by a large number of participants in their comments on the paper. In general the approach outlined was for operating expenditure to be recovered from suppliers on an energy basis through the Variable Market Operator Charge. Capital costs were proposed to be recovered from suppliers and generators on a per unit basis. The Imperfections Charge was expected to recover (un)instructed imbalance and make-whole costs from suppliers on an energy basis and an associated Generator-Under-Test Charge to recover generator testing costs from generators. In addition, two fees are levied on all participants before they can begin trading in the SEM, an Accession Fee and a Market Participation Fee. These were proposed to be activity based charges that recover the costs associated with accession to the T&SC, and registration. The money recovered through the accession and participation fees will be offset against operating costs in the subsequent tariff period.

There is no real change from this approach proposed here. AIME tariffs will recover the bulk of its revenue from suppliers on an energy basis as this is simple, transparent and the most likely approach to ensure cost recovery in any given year. It is proposed that capital expenditure will be recovered through the tariffs over a 5 year period but that operating and imperfections revenue requirements are based on recovery over an 11 month period from November 1st 2007.

5.3. Market Operator Accession Fee

The Accession Fee is an activity based charge. The fee is payable once on becoming a Party to the Framework Agreement and covers the administration costs involved. This service is provided by AIME and includes responsibility for managing the processes for accession of Party's to the Framework Agreement such as verification of their suitability, and validation against registration criteria, the details of which are included in Agreed Procedure (AP) 01²⁰. Revenue recovered will be offset against AIMEs operating costs in the following tariff control period, to ensure no double recovery of staff costs. The market operator Accession fee is €6,000 per party.

²⁰ http://www.allislandproject.org/2007/ap1v2_0.pdf

Table 19 Market Operator Accession Fee

Process Step	Party Registration		
	Person Days -->	FTE	Legal
Receipt		0.5	
Validation		2	
Clarifications		5	
Approval		1	
Framework Agreement		0.5	0.5
Record applicant as Party		0.5	
Maintain and Publish list		0.5	
	Person Days Total -->	10	0.5
	Fees per Staff Type -->	€5,000	€1,000
	Accession Fee		€6,000
Chargeout Rates		(€/day)	
FTE		500	
Legal		2000	

5.4. Market Operator Participation Fee

The Participation Fee is an activity based charge payable once with an application to register as a participant in respect of each unit and recovers the costs associated with this process. Revenue recovered is offset against AIMEs operating costs in the subsequent tariff period, to ensure no double recovery of staff costs. The details of Participant registration are also contained in AP 01. As a result of different workloads being required for different unit types, a separate Generator Unit and Supplier Unit charge is proposed.

Table 20 Market Operator Participation Fee

Process Step	Unit Registration		
	Person Days -->	Supplier Unit	Generator Unit
Receipt		0.5	0.5
Validation		2	2
Clarifications		5	5
Communications Assessment		3	3
Credit Cover Assessment		5	0
Default Data Assessment		2	5
Facilities Connection Assessment		5	10
Approval		1	1
Record Unit		0.5	0.5
Maintain and Publish list		0.5	0.5
	Person Days Total -->	24.5	27.5
	Fees per Unit Type -->	€12,250	€13,750
	Participation Fee	€12,250	€13,750
Chargeout Rates		(€/day)	
FTE		500	

5.5. Market Operator Variable Charge

The Variable Market Operator Charge is levied weekly in respect of net demand at supplier units, and is expressed in €/MWh. It was proposed that AIMEs operating costs²¹ and the associated working capital and currency costs are recovered through this charge.

Table 21 Variable Market Operator Charge

Variable Market Operator Charge	
AIME Operating Cost	€20,951,000
Supplier Energy Forecast	35,095 GWh
Supplier Unit Net Demand	€0.597 /MWh

5.6. Market Operator Fixed Charge

The Fixed Market Operator Charge is levied monthly in respect of each generator and supplier unit. As proposed in the Tariff Methodologies paper AIME cost of capital will be recovered through this tariff. This cost is discussed in section 4.5.

Table 22 Fixed Market Operator Charge

Fixed market Operator Charge	
Investment Return	€2,672,000
Total Units	75
Per Unit Charge	€3,239/month

5.7. Market Operator Imperfections Charge

The Imperfections Charge is proposed to cover net payments to generators for constraints, uninstructed imbalances and make-whole payments. This charge is levied in respect of supplier units, expressed in €/MWh. As per AIMEs obligations this tariff is detailed in Appendix 5 in the TSO submission.

Table 23 Market Operator Imperfections Charge

Imperfections Charge	
Imperfections Forecast	€109,254,000
Supplier Energy Forecast	35,095 GWh
Imperfections Charge	€3.113/MWh

5.8. Market Operator Generator under Test Charge

The T&SC requires that AIME publish a schedule of testing tariffs that are to be used in the calculation of charges for units under test. The schedule of testing tariffs is intended to permit different levels of charges to be levied for generator units of different sizes and at different test phases.

²¹ These were outlined in appendix A of the Tariff Methodologies consultation and are discussed in the Revenue Submission in section 3.3.

A schedule of testing tariffs is therefore not being submitted as part of this AIME revenue submission. The TSOs will derive the schedule of testing tariffs and further discussion is required with the RAs.

5.9. Capacity payments

The T&SC requires that AIME administer capacity payments. These capacity payments are made to generators and recovered through a levy on suppliers, based on their monthly energy consumption. It is expected that the pot of money available for capacity is scaled in each monthly billing period to match the energy consumed. Since this is done on a retrospective basis, there should be no cost to AIME associated with these payments. However, it is expected that, should a cost be incurred, this will be treated on a pass through basis.

Appendix 1 – Summary of AIME Revenue Requirement and Tariffs

AIME Revenue Requirement & Tariffs	
Operating Expenditure (€000s)	
Payroll	5,395
Professional Fees	1,200
Facilities	1,247
IT & Communication	2,377
Research & Development	250
Depreciation	9,985
Currency	0
General & Admin	497
Working Capital	0
Total	20,951
Capital Expenditure	
SEM Programme	42,609
SMO Establishment	8,070
AIME Market Trial	3,783
Year One Capital Programme	0
Total	54,462
Investment Return	
Total	2,672
Imperfections	
Constraints	109,254
Total	109,254
Total 11 Month AIME Revenue Requirement	132,877
AIME Tariffs	
Inputs	
Operating Expenditure (€000s)	20,651
Return (€000s)	2,672
Imperfections (€000s)	109,254
Units	75
Energy (GWh)	35,095
Outputs	
Fixed Market Operator Charge	€3,239/month
Variable market Operator Charge	€0.597 /MWh
Accession Fee	€6000/Party
Participation Fee (G)	€13,750/Unit
Participation Fee (S)	€12,250/Unit
Imperfections Fee	€3.113/MWh

Appendix 2 – Description of AIME Capital Expenditure

The capital expenditure recovered by AIME includes expenditure related to SEM Implementation, Programme Wide and Rules & Modelling, collectively the SEM Programme, and SMO Establishment. It does not include costs related to EirGrid/SONI/NIE Readiness Projects as these will be recovered through the respective TSO Revenue Submission.

SEM Programme

The objective of the SEM Implementation Project is to implement the central market systems and processes required for operation of the Single Electricity Market. This encompasses those functions nominally performed by the Spot Market Operator.

Specific activities within the scope of the SEM Implementation Project include:

- **Communications & Industry Liaison:** Maintaining communications with internal and external stakeholders related to all SEM Establishment activities. This will include liaising with participants, NIAER and CER, and other industry players, throughout the market establishment.
- **Business Processes & Procedures:** Definition of new and modified business processes for areas falling within the functional scope of the SEM Implementation Project. Definition of detailed procedures and metrics in selected areas.
- **System Specification:** Specification of the functional and non-functional requirements of the systems required for SEM, both new and modified, as well as interfaces, between the market systems and to legacy systems.
- **System Selection (New):** Selection of new systems required for SEM, based upon a packaged-software approach, agreement of supplier scopes of work, including required customisation and configuration, and negotiation of supplier contract(s).
- **System Gap Analysis & Design:** Identification of existing systems requiring modification (for central market functions only), and analysis of gaps between requirements and current functionality. This will also include technical design for any systems requiring bespoke development.
- **Technical Architecture:** Definition of the technical architecture for the market systems, including security, capacity, technical environments.
- **System Implementation and Integration:** Implementation of the market systems, including configuration and customisation of new packages, modification of existing systems, development of bespoke systems, interfacing and integration, product testing (including factory and site testing), integration testing (including user acceptance), data preparation/conversion and production cutover.
- **Technical Infrastructure:** Implementation of technical environments and associated architectural components, e.g. security.
- **Training:** Definition of training needs and training plan, creation of training materials and delivery of training to Market Participants (for concept and system interfaces training), and TSO/AIME personnel (for concept, process and system training).
- **Market Trial:** Planning of the Market Trial – an “as real” operational test of market systems and processes, involving all market participants and the market operator.

The Programme Wide and Rules & Modelling expenditure spans both SEM Implementation and SMO Establishment. The project wide programme covers activity related to inter project coordination, project governance and professional fees relating to the client side advisor.

- Project Management: Project management support to all SEM/SMO Establishment activities (SEM Implementation, SMO Establishment, and Rules & Modelling).
- Programme Office: Provision of programme office support to all SEM/SMO Establishment activities (SEM Implementation, SMO Establishment, Rules & Modelling).
- Market Rules: and contribution to rules development forums.
 - ⇒ Evaluation of high-level market design and identification of issues.
 - ⇒ Involvement in Detailed Market Design.
 - ⇒ Provision of specialist technical advice on Power System and Market Operation dynamics and requirements to Regulators.
 - ⇒ Input to, specification of and evaluation of detailed market Rules
 - ⇒ Evaluation of Detailed Market Design and Rules in terms of IT systems and business process feasibility
 - ⇒ Membership and participation on all Rules working groups and specific expert groups
- Market Modelling: Continuation of existing work to model the cost/benefit impacts of the SEM.

SMO Establishment

The objective of the SMO Establishment Project is to ensure that a Single Market Operator (AIME) organisation is established, and operationally ready, in time for commencement of the Market Trial. Establishing AIME has significant legal, contractual, system and process impacts for SONI and EirGrid. Implementing this change requires a large number of activities to be undertaken, with contributions from a wide range of personnel.

Specific tasks encompassed within the scope of the SMO Establishment Project are:

- Contract Negotiation and Corporate Approval: Appropriate support for the development and negotiation of a series of legal agreements between the Parties – setting out authorities, rights, obligations and liabilities. The core agreements are:
 - ⇒ the MOU;
 - ⇒ the Project Implementation Agreement;
 - ⇒ Heads of Agreement for AIME;
 - ⇒ the MOA; and
 - ⇒ Service level agreements.
- Legal Drafting & Review: There will be a significant requirement for legal drafting and legal review of agreements, licences, and other documentation necessary for AIME establishment.
- Regulatory Approval: Preparing supporting material for, and interaction with, the Regulators, in order to gain key regulatory approvals (e.g. for cost recovery).

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- **Licensing & Legislation:** Interaction with the licensing and legislative process required for the establishment of the SEM, and provision of related support (for example, drafting papers and preparing other briefing materials for SONI/EirGrid Management)
 - **Business Plan:** Development of the business plan for AIME, which is likely to cover:
 - ⇒ statement of objectives (including whether for profit);
 - ⇒ scope of services;
 - ⇒ operating model, including organisation and resourcing, governance, ownership, marketing and communication strategies;
 - ⇒ financial forecasts including operational budgets; and
 - ⇒ funding requirements.
 - ⇒ **Funding:** Securing and putting in place the necessary funding arrangements for the establishment of AIME.
 - **Organisation Structure and Staffing:** Definition of the organisation design for AIME. This activity will also include identification of staffing requirements (i.e. roles, job titles, and responsibilities) and any staffing/skills gaps.
 - **Organisational Establishment:** Establishment of the organisational infrastructure for AIME. This work is to include:
 - ⇒ the procurement, fit out and design of office space;
 - ⇒ the implementation of corporate systems, if required, such as helpdesk software;
 - ⇒ the development of HR, IT, financial and other organisational policies; and
 - ⇒ contracting with other service providers - “Other” here means with service providers other than the TSOs (contracting with the TSOs is addressed under the “Contract Negotiation & Corporate Approval” activity).
 - **Operational Transition:** As the market nears commencement, it will become necessary for AIME to begin taking on responsibilities previously performed by various implementation teams. This will include taking on responsibility for:
 - ⇒ communication with internal and external stakeholders;
 - ⇒ liaison with the CER/NIAER and other industry players;
 - ⇒ participant training;
 - ⇒ registration of market participants; and
 - ⇒ operation of market processes and systems.

Appendix 3 - AIME Activities

This appendix is derived from an analysis of the T&SC v1.0.

Scheduling & Pricing

Activities	Objectives/Targets	Source
Manage Bids/offers	Effective Capture of offers and bids	T&SC
Manage Required Data	Effective Capture/update of all required data for market scheduling	T&SC
Determine Market Schedule	Produce accurate market scheduling amounts (assuming accurate inputs)	T&SC
Publish Market Information	Publish ex-ante market schedule by 13:00 on trading day -1	T&SC
Publish Market Information	Publish Modified Interconnector User Nominations by 11:30 on trading day-1	T&SC
Publish Market Information	Publish ex-post indicative market schedule by 16:00 on trading day+1	T&SC
Publish Market Information	Publish ex-post initial market schedule by 16:00 at trading day+4	T&SC
Publish Market Information	Publish market scheduling related information on time	T&SC

Settlement

Activities	Objectives/Targets	Source
Manage Required Data	Capture effectively required data for settlement and invoicing activities	T&SC
Create Settlement Statements	Produce accurate settlement statements (assuming accurate inputs)	T&SC
Create Settlement Statements	Issue indicative settlement statements by 5pm on trading day+1/ capacity period+1	T&SC
Create Settlement Statements	Issue initial settlement statements by 12pm on trading day +5/ capacity period +5	T&SC
Create Settlement Statements	Issue revised settlement statements by billing period+4 months/ billing period +13months/ capacity period +4 months/ capacity period +13months	T&SC
Produce Invoices/Credit Notes	Produce accurate invoices/credit notes (assuming accurate inputs)	T&SC
Produce Invoices/Credit Notes	Issue Initial invoices/credit notes by 12pm on trading day +5/ capacity period +5	T&SC
Produce Invoices/Credit Notes	Issue Revised invoices/credit notes by billing period+4 months/ billing period +13months/ capacity period +4 months/ capacity period +13months	T&SC
Produce Invoices/Credit Notes	Issue Ad-hoc invoices/credit notes by the defined timeframe	T&SC
Publish Market Information	Publish settlement & invoices related information on time	T&SC
Manage Settlement Reallocation	Conduct accurate settlement reallocation assessment	AP9
Manage Settlement Reallocation	Implement settlement reallocation procedure within the timeline define by the AP9	AP9

Credit Management

Activities	Objectives/Targets	Source
Review Participant Credit Cover	Issue credit cover decrease notice where Participant exposure is less than or equal to 67% of posted collateral.	AP9
Review Participant Credit Cover	Issue credit cover increase notice where the ratio of Participant exposure to posted collateral exceeds the trade limit.	AP9
Manage Default Credit Events	Issue a default notice where a Participant fails to adequately respond to a credit cover increase notice within 2 working days	AP9
Manage Default Credit Events	Issue a suspension notice where a Participant fails to adequately respond to a default notice within 2 hours	AP9
Manage Default Credit Events	Issue a termination notice where a Participant fails to adequately respond to a suspension notice within 7 days	AP9
Manage Default Credit Events	Issue accurate default, suspension and termination notices	AP9
Manage Default Credit Events	Send copies of all issues notices to the RAs, TSOs and relevant Distribution Operator	AP9
Publish Market Information	Publish credit management related information on time	T&SC

Funds Management & Treasury

Activities	Objectives/Targets	Source
Manage Currency	Capture daily currency exchange rates	T&SC
Manage payables	Funds will transferred to generators by 17:00 each Thursday for invoices issued the previous week.	AP8
Manage payables	Ensure the adequacy between money paid and available funds on the market accounts	AP8
Manage payables	Perform accurate transfer of funds and collaterals	T&SC
Manage Unsecured Bad Debt	Implement effective suspension and termination processes	AP9
Manage Unsecured Bad Debt	Issue a termination notice where a Participant fails to adequately respond to a suspension notice within 7 days	AP9
Manage Unsecured Bad Debt	Issue accurate default, suspension and termination notices	AP9
Publish Market Information	Publish Fund Management & Treasury related information on time	T&SC

Customer Service

Activities	Objectives/Targets	Source
Register Parties and Participants	Inform any applicant about any required information or clarifications within 10 working days of receiving the application Form or the Participant notice	T&SC
Register Parties and Participants	Reject any application form or any Participant notice where the applicant fails to provide the required clarification within 20 working days	T&SC
Register Parties and Participants	Provide the applicant a framework agreement where all application requirements are satisfied	T&SC
Register Parties and Participants	Inform Parties about any eligibility requirements for registration within 5 working days following the receipt of a complete notice and any additional information	T&SC

Register Parties and Participants	Issue commencement notice to Participants specifying the commencing effective date to trade in the SEM.	T&SC
Manage Queries	Close settlement or data queries within 10 days of query being logged.	T&SC
Manage Dispute resolution	Issue a notice of dispute for any “non-closed” raised query (data or settlement) within 10 days (or any other defined/approved timeframe)	T&SC
Publish Market Information	Publish Customer Service related information on time	T&SC

Market Development

Activities	Objectives/Targets	Source
Support the Modification Committee	Ensure the compliance with modification processes and procedures as defined by the Code	T&SC
Support the Modification Committee	Publish information related to the modifications process (notices) and the status of each modification proposal within 2 days of receipt	T&SC
Support the Modification Committee	Submit quarterly reports to the RAs including the progress and status of modification proposals	T&SC
Manage Market changes	Coordinate effectively implementation of changes within the defined timeframe	T&SC
Manage Market changes	Publish any Code modification or any Agreed Procedure modification within two working days after approval by the Regulatory Authorities.	T&SC
Manage Regulatory Interface	Report to the Regulatory Authorities in writing on a monthly basis and publish information about the performance by the Market Operator of its obligations, functions and powers under the Code; and information about the performance by the Parties of their obligations and functions under the Code	T&SC

Information Technology

Activities	Objectives/Targets	Source
Manage Infrastructure & Operations	24x7 availability of Market Systems	T&SC
Manage Infrastructure & Operations	Manage market Systems on a secure basis	T&SC
Manage Infrastructure & Operations	Plan & coordinate testing and upgrade events to minimise impacts.	T&SC

Appendix 4 - AIME Publication Obligations

The following table contains details of AIMEs publication obligations as contained in T&SC v1.0. These are currently under discussion and therefore indicative only.

Data	Frequency	Time	Data Set
Publish Rolling Wind Forecast (D+2)	Daily	00:00	Once Every 6 Hours for next two days
Publish Daily Interest Rate (D-1)	Daily	07:45	D-1
Publish Trading Day Exchange Rate (D-1)	Daily	08:00	D-1
Publish Daily Load Forecast (D-4 to D-1)	Daily	09:30	D-4 to D-1
Publish Daily Generator Outage Schedules (D-4 to D-1)	Daily	09:15	D-4 to D-1
Publish Daily Transmission Outage Schedules (D-4 to D-1)	Daily	09:15	D-4 to D-1
Publish Interconnector ATC (D-2) by Trading Period	Daily	10:00	D-2
Publish Modified Interconnector User Nominations (D-1)	Daily	12:00	D-1
Publish Initial Settlement Statements	Daily	12:00	D+4
Publish Interconnector ATC (D-1)	Daily	12:00	D-1
Publish Interconnector User Nominations per Interconnector Administrator (D+1)	Daily	13:00	D+1
Publish Ex-Ante Indicative Market Schedule Summary (D-1)	Daily	13:00	D-1
Publish Ex-Ante Market Schedule by MP (D-1)	Daily	13:00	D-1
Publish Dispatch Instructions (D+1)	Daily	14:00	D+1 (or next Working Day)
Publish Meter Generation or Demand Price Setter Data (D+1)	Daily	14:00	D+1
Publish Meter Demand Data (D+1)	Daily	14:00	D+1 (or next Working Day)
Publish Meter Demand Data (D+3)	Daily	14:00	D+3 (or next Working Day)
Publish Meter Data (M+4)	Daily	14:30	M+4 (or next Working Day)
Publish Meter Data (M+13)	Daily	14:00	M + 13 (or on the next working day)

Publish Modified Interconnector User Nominations	Daily	16:00	D+1
Publish Indicative Actual Schedule (Summary and by MP)	Daily	16:00	D-1
Publish Indicative Ex-Post Indicative Market Schedule Summary (D+1)	Daily	16:00	D+1
Publish Ex-Post Indicative Market Schedule by MP (D+1)	Daily	16:00	D+1
Publish (Indicative) Daily Market Prices	Daily	16:00	D+1
Publish Initial Ex-Post Indicative Market Schedule Summary (D+1)	Daily	16:00	D+4
Publish Initial Ex-Post Market Schedule by MP (D+4)	Daily	16:00	D+4
Publish (Initial) Daily Market Prices	Daily	16:00	D+4
Publish Required Credit Cover (D-1)	Daily	17:00	D-1 (or next Working Day)
Publish Indicative Settlement Statements	Daily	17:00	D+1
Publish Resettlement (M+4) Settlement Statements	Daily	17:00	M+4 (or next Working Day)
Publish Resettlement (M+13) Settlement Statements	Daily	17:00	M + 13 (or on the next working day)
Publish Loss of Load Probability (M+4)	Daily	17:00	M+4 (or next Working Day)
Publish Loss of Load Probability (M+13)	Daily	17:00	M + 13 (or on the next working day)
Publish Meter Generation or Demand Price Setter Data (D+3) Needs to be distinguished from the earlier item.	Daily	17:30	D+3
Publish Monthly Load Forecast	Monthly	10:00	At least one Working Day before start of Month
Publish Monthly Generator Outage Schedule	Monthly	10:00	At least one Working Day before start of Month
Publish Monthly Transmission Outage Schedule	Monthly	10:00	At least one Working Day before start of Month
Publish Monthly Updates to Settlement Classes	Monthly	10:00	At least one Working Day before start of Month
Publish Initial Capacity Settlements and Invoices	Monthly	12:00	M+4 (or next Working Day)
Publish Indicative Capacity Settlements and Invoices	Monthly	17:00	M + 1 (or on the next working day)
Publish Interconnector Capacity Auction Results (Monthly)	Monthly		

Publish Annual Load Forecast	Yearly		Run on a working day, four months before the year
Publish Annual Interconnector Data	Yearly		Run on a working day, four months before the year
Publish Annual Settlement Parameters	Yearly		Run on a working day, four months before the year
Publish Annual Market Parameters	Yearly		Run on a working day, four months before the year
Publish Annual Credit Parameters	Yearly		Run on a working day, four months before the year
Publish Annual Capacity Parameters	Yearly		Run on a working day, four months before the year
Publish Annual Transmission System Parameters	Yearly		Run on a working day, four months before the year
Publish Annual Capacity Exchange Rate	Yearly		Run on a working day, four months before the year
Publish Resettlement (Ad hoc) Settlement Statements	Ad hoc	17:00	
Publish Resettlement Market Schedule by MP (in the event of a dispute)	Ad hoc		(Working Day)

Appendix 5 - TSO Imperfections Submission

This appendix contains a forecast of constraint costs in the Single Electricity Market (SEM) for the period from 1st November 2007 to 30th September 2008 as prepared by the Transmission System Operators (TSOs).

This forecast has been prepared jointly by the TSOs and is the first all-island estimate of constraint costs for the new market. This forecast is used by the Single Market Operator (AIME) in the derivation of the Imperfections Charge which is levied on suppliers by AIME. The Imperfections Charge includes the net costs of constraints, uninstructed imbalances and make whole payments. The TSOs are responsible for forecasting the constraint cost and managing the constraint cost outturn in the new market. AIME will act purely in a recovery and payment capacity.

The TSOs forecast constraints to be approximately €109 million for the 11 month period from November 1st 2007 to 30th September 2008.

The estimate of constraint costs includes:

- an estimate of the forecasted cost of constraints for the submission period;
- any over/under recovery from the previous period's forecast; and
- any charges incurred for the holding or use of any associated banking standby facilities.

As this is the first forecast period for the new market, there was no prior period and therefore no adjustment for prior under/over recovery. As the financing arrangements have not been used as of yet there is no charges associated with them, however this will likely change in future years.

Currently, demand customers in the Republic of Ireland pay for constraints through EirGrid's TUoS tariff mechanism. This tariff is based on an annual forecast of constraint costs that relates to the Irish transmission system and the existing bi-lateral energy market in Ireland. In Northern Ireland, the actual energy production cost (which includes the cost of constraints in Northern Ireland only) is reflected in the Bulk Supply Tariff paid by Northern Ireland demand customers.

Under the SEM there is a single constraint cost for the island as a whole based on the new market rules, as specified in the T&SC, applied to the combined portfolio of generation. This will lead to different constraint costs than those that would be incurred in two smaller, independent, markets. In addition to market size and rules, the other major factor that will influence constraint costs will be the impact of the tie-line between the Republic of Ireland and Northern Ireland. While currently the cost of restrictions on the tie-line (which exist for a number of security reasons) are accounted for in the total production cost of energy within each individual market, in the SEM these restrictions will appear as a constraint cost which will be recovered through AIME's Imperfections Charge.

The following sections provide some general background information on constraints, an overview of the constraint cost forecasting process, details of some of the key assumptions that formed the basis of the forecast and a number of risk factors that could have significant impacts on the forecast. Finally, constraint cost recovery is discussed.

Background Information on Constraints

The TSOs, in ensuring continuity of supply and the security of the system in real time, may have to dispatch some generators differently from the ex-post output levels indicated by the market software's strict merit order. Generators receive constraint payments to keep them financially neutral for the difference between the market schedule and the actual dispatch.

Constraint costs therefore arise to the extent that there are differences between the market determined schedule of generation to meet demand (the 'market schedule') and the actual instructions issued to generators by the TSOs (the 'actual dispatch'). A generator that is scheduled to run by the market but which is not run in reality is 'constrained off'; a generator that is not scheduled to run by the market but which runs in reality is 'constrained on'. Some of the terms above are explained in more detail in the Glossary.

In order to balance supply and demand, a generator that is constrained off/down will always result in another generator being constrained on/up and vice versa. As the price of the constrained on/up unit is generally greater than the constrained off/down unit, there will always be a net cost associated with constraints.

The actual dispatch of generation is based on the same commercial data as used in the production of the market schedule and so will largely be similar to the market schedule. However, because the TSOs must take into account the technical realities of operating the power system, the actual dispatch will deviate from the market schedule to a variable extent and hence constraints will arise. Constraints also arise due to approximations and assumptions used in the production of the market schedule as compared to the actual dispatch. The following are the main categories of issues that can lead to a difference between the market schedule and actual dispatch and hence constraint costs.

Transmission

In order to ensure the safe and secure operation of the transmission network, it may be necessary to dispatch specific generators to certain levels to prevent equipment overloading, voltages outside limits and system instability. Generators may be both constrained on/up or off/down thus leading to the actual dispatch deviating from the market schedule as the market schedule does not account for any transmission constraints.

Reserve

In order to ensure the continued security and stability of the transmission system in the event of a generator tripping, the TSOs instruct some generators to run at levels that ensure the availability of spare generation capacity (known as reserve) which can quickly respond during such tripping events. To ensure the demand-supply balance generators will be both constrained on/up and off/down, again leading to the actual dispatch deviating from the market schedule which does not account for reserve requirements.

Perfect Foresight

The market schedule of generation is produced after real time ('ex-post') by the market software using known actual demand, wind output and generator availabilities. However, as the TSOs do not have this perfect foresight, they must plan and operate the system to account for possible variations in these parameters. For example, the tripping of a generator unit is 'known' by the market scheduling software and it will take into account the unavailability of this unit in the production of the market schedule. The TSOs, however, will respond to the event in real time by re-dispatching generation to maintain system security. The market schedule and actual dispatch will therefore differ.

Market Modelling Assumptions

Due to mathematical limitations, approximations and assumptions in the market schedule software, the market schedule will not always be technically feasible. This is mainly due to a number of generator technical capabilities and interactions not being specifically modelled (e.g., the market software assumes that generators can synchronise and reach their minimum load level in 15 minutes, in reality this may take much longer; the market software assumes a single generator ramp rate whereas in reality many generators have multiple ramp rates). In actual dispatch, the TSOs and generators are bound by these technical realities and so the market schedule and actual dispatch will differ.

Constraint Modelling

The modelling of constraints and production of the cost forecast has been a joint process involving both TSOs. Detailed market, transmission system and generation models were developed and analysed utilising the simulation package PLEXOS, which captured some of the key transmission and reserve constraints. This was then supplemented with specific analysis of constraint effects which it was not possible to model and capture in PLEXOS. As this is an estimate of constraints approximately a year ahead, for a market that does not yet exist, the assumptions that are made are critical to the forecast.

In the sections below, some of the key assumptions are outlined, followed by details of the PLEXOS model and the analysis of specific constraint effects. There are a number of risk factors that could have a significant impact on the constraint cost which have not been included in this forecast.

Key Assumptions

The following table highlights the key assumptions used in the production of the TSOs constraint cost forecast.

Item	Assumption
Forecast Period	The constraint cost forecast is for an 11 month period, 1st November 2007 to 30th September 2008.
Currency	All constraint costs are modelled in euro.
Fuel Prices	Fuel prices are based on the Pöyry fuel price report to EirGrid (September 2006). Carbon costs have been added to fuel prices. All fuel prices are quoted in euro.
Participant behaviour	It was assumed that generators bid according to their short run marginal cost (SRMC).

Demand Forecast	As per published documents
Scheduled outages (generation and transmission)	Based on provisional outage plans
Generator Forced Outage Probabilities	Based on historical data.
N-1 contingency analysis	Not modelled, proxy constraints used instead.
Transmission forced outages	Not modelled
BETTA Prices (Moyle)	Offered as inexpensive generation
Louth-Tandragee NTC	North-South 300 MW; South-North 200 MW at all times.

PLEXOS modelling

PLEXOS has been used in the SEM Rules & Modelling workstream. The analysis used a model of the transmission and generation systems across the whole island, with key assumptions around factors such as outage schedules, demand levels, plant availability, fuel prices and wind output. It also assumed that generators bid their short run marginal cost into the market and this was the basis for setting the system marginal price and determining constraint costs.

By performing multiple runs of the PLEXOS model, adding in key reserve requirements and specific transmission constraints, the effect in terms of increases in total production cost can be analysed. This difference in production cost between these simulations represents the constraint costs associated with the modelled transmission and reserve constraints.

The total cost of the constraints that could be modelled and analysed in the PLEXOS system is estimated to be approximately €79.0 million.

A summary of the key PLEXOS modelling and associated assumptions is provided in Annex 1.

Specific Constraint Modelling

As it is not possible to model all constraint cost drivers in PLEXOS, further analysis of specific constraint effects was performed. This builds on the PLEXOS models described above and looked at the effect and impact of:

- perfect foresight;
- market modelling assumptions;
- specific transmission system constraints;
- specific reserve constraints; and
- other factors.

Perfect foresight

Changes to demand and generator availability

Since it is calculated ex post, the EPUUC (Ex-post unconstrained unit commitment) schedule has the benefit of perfect foresight of changes in demand and generator availability. System operators do not have this advantage and must respond to such changes as and when they happen. For example, following the tripping of a generator, the system operator must activate reserves and will typically have to replace the lost generation using fast start plant (e.g. OCGTs) at a significant cost. EPUUC, on the other hand, since it knows that the generator will trip, can schedule the most economic replacement plant in anticipation of the tripping. This continuous information asymmetry results in considerable additional constraint costs over the year.

Impact of wind variability and forecastability

Wind is inherently a variable resource. EPUUC, thanks to its perfect foresight, can schedule the most economic conventional generation to balance this variability. The system operator, on the other hand, since it is not always aware of the timing or extent of these variations, must balance them using a combination of part-loaded plant and expensive fast-start plant. This less optimal schedule will cause an increase in constraint costs.

Moyle schedule set D-1

The Indicative Market Schedule is performed D-1 and provides generators with indicative running regimes. However, in the case of interconnector user, the IMS determines the dispatch quantities. The EPUUC schedule, with the benefit of perfect foresight, may determine a different schedule to the IMS. Any differences between these schedules will act to increase constraint costs. The impact of this on constraint costs will depend on the interaction of a number of factors – differences between SMP in indicative and ex post schedules, aggregate Moyle supply curve, and the generation supply curve. In the absence of any historical data for these factors, it is difficult to estimate the likely costs that will arise so a modest provision is made.

Market modelling assumptions

The EPUUC software makes a number of modelling assumptions and simplifications that are necessary to allow it generate robust solutions in a reasonable length of time. These simplifications will, at times, result in a schedule that would be impossible in reality, even in the absence of transmission system constraints. The consequence is that additional constraint payments will arise. Key assumptions include:

Block Loading

EPUUC assumes that, when synchronising, a generator reaches minimum load in 15 minutes. In practice, it can take significantly longer, particularly for cold units. In actual dispatch, therefore, it will be necessary to synchronise such units earlier than EPUUC, resulting in out-of-merit constraint costs.

A further impact of the block loading simplification is that EPUUC may choose to two-shift a unit (i.e. shut it down overnight and bring it back on the following morning) with just enough time off load to respect the unit's minimum down-time. In practice, due to the loading and de-loading rates, it may be necessary to keep the unit on overnight (even though it appears to EPUUC to be out of merit).

Single ramp rate

Generators are allowed to submit several ramp rates (dependent on MW output) and a number of dwell times (where a fixed load must be held for a period). In contrast, EPUUC assume one single average ramp rate. In addition, EPUUC applies this average ramp rate to the average output per trading period whereas in reality ramp rates apply to spot MW outputs. These modelling inaccuracies will result in increased constraint costs, particularly during period of rapid load change.

Hydro limitations

There are a number of special limitations that apply to hydro stations that it is not possible to model in EPUUC. For example, a drawdown restriction requires gradual, sequential loading and unloading of the sets in a hydro station. This type of restriction means that, in practice, the limited hydro energy cannot be used at the most economic times, resulting in an increase in constraint cost. Other limitations on optimal hydro running include reservoir coupling (unit output dependent on the output of an upstream unit), environmental restrictions (e.g. fish spawning) and plant shutdown due to external factors. Overall these factors are not considered to contribute that significantly to constraint costs.

Generator constraints

Some generators have complex operating characteristics and modes that EPUUC is unable to model. Possible market mechanisms for dealing with these operational issues are being investigated by the SEM implementation team and the Regulatory Authorities. A small provision is made pending the development of an enduring solution to these constraints.

For example, some generators, particularly peaking units, may be subject to limitations on run hours or the number of starts per year. Since EPUUC is unable to model this type of generator constraint, it is expected that these generators will be allowed to submit prices above SRMC to reflect their limitation. Nevertheless, there will still be occasions where such generators appear to EPUUC to be in merit. Prudent system operation would suggest using an alternative generator, even if it is more expensive, to conserve the limited generator for times of capacity shortage. Constraint costs will arise due to the price differential that occurs.

Trips during generator run-up

The most likely time for a generator to trip is during its run-up. It is not uncommon for a generator to trip a number of times in quick succession before achieving stable operation. When this occurs the generator will receive multiple sync instructions. However, if the trips are close together, the unit will appear to be continuously available (although possibly with reduced availability) to EPUUC due to the half-hour resolution of EPUUC. Therefore EPUUC will have at most one start for the unit. The extra starts due to the trips will appear as a constraint cost. This cost could be avoided by introducing a rebate mechanism into the T&SC.

Within-day testing

Within-day testing has been highlighted as an issue that is not dealt with in the Trading and Settlement Code. The proposed solution involves uninstructed imbalance payments for the out-of-merit running necessitated by the test. No allowance has been made for the resulting constraint costs on the assumption that the uninstructed imbalance payment parameters (DOG and PUG) are set sufficiently far apart to allow recovery of these costs.

Transmission System

Transmission line limits are modelled in PLEXOS. However, there are some other transmission system constraints which it is not possible to model. These include the following:

Radially connected wind

Since wind has priority dispatch, it is not expected to be constrained down to relieve transmission constraints. However, radially connected windfarms will be constrained off when the radial connection is unavailable. Scheduled outages of these lines have been included in the PLEXOS study. Forced outages are not included in PLEXOS so it is necessary to make provision for the impact of forced outages of these lines.

Moyle NTC fixed D-2

Moyle NTC is set at D-2, at which point capacity is allocated to market participants. Any changes to NTC after this point could result in constraint payments. While this is a potentially significant risk, it is difficult to quantify the circumstances in which it will arise and as such no provision is made here.

Reserve

PLEXOS includes requirements for primary, secondary and tertiary operating reserves. Factors which cannot be modelled in PLEXOS are detailed below.

Turlough Hill

Turlough Hill is a critical source of spinning reserve. While reserve provision is modelled in PLEXOS, it is not possible to model all the operating modes. In particular, the min generation mode allows provision of reserve at very low loads but at a much lower efficiency than normal operation. This efficiency reduction effectively reduces the total energy available in the actual dispatch. This energy must be replaced (by the marginal plant), resulting in additional constraint costs over the day.

Turlough Hill is capable of operating as a synchronous condenser while providing secondary reserve (a mode known as “spin gen”). No water is used in this mode but a small amount (less than 1 MW) of power is consumed by the unit. This demand will not be in the EPUUC schedule so will appear as a constraint cost.

A provision has been made for both of these factors.

Replacement reserve

Large thermal units have run up times in excess of 2 hours. Whilst operating reserves will cover the sudden loss of a large unit this operating reserve will come from units with short run-up times. Following such an event it may not be possible to replace the operating reserves as the off load plant could have longer start-up times. For this reason the system operator will often keep on a large thermal plant rather than just peak shave with OCGTs.

Increased regulation at night

Recent operational experience has shown that wind variability causes an increase in the frequency fluctuations on the system. This is particularly problematic at night when the system demand is lower (hence the system inertia is lower). To counteract this, it is necessary to increase the amount of regulating reserve. Since it has not been possible to model this in PLEXOS, an estimate of the cost has been calculated.

Other factors

Wind Curtailment

Previous studies by EirGrid have shown that at the levels of wind expected in 2008 (approximately 1,400 MW on the island of Ireland), it will be necessary to curtail wind from time to time due to its variable nature. The amount of curtailment has been estimated to be up to 2%. If the windfarms are compensated for this curtailment, the cost of the replacement energy will appear as a constraint cost.

Moyle: SO-SO trades

The T&SC allows for within-day system operator to system operator trades on the interconnector. Any such trades will have to be balanced by corresponding changes to generator dispatch so will appear as a constraint cost. It is assumed that trades will only take place if there is an opportunity to reduce overall constraint costs. Therefore a negative provision is made.

Transitional Issues

At the start of the SEM there will be a learning period for all parties involved: generators, suppliers, system operators, the RAs and the Market Monitoring Unit. In addition, there may be idiosyncrasies in the T&SC and market systems, or approved changes to the T&SC that have not yet been implemented. All of these issues are temporary but have the potential to add to constraint costs. It is considered prudent to make provision for this for the first few months of the SEM.

Uninstructed Imbalances

Uninstructed imbalances (positive or negative) require corresponding constraining (down or up) of other generators. It is assumed that the uninstructed imbalance payment parameters (DOG and PUG) are set sufficiently far apart to allow recovery of the additional constraint costs incurred.

Participant behaviour

It is assumed that generators bid in their short run marginal costs in all cases.

Summary of constraint costs

Description		Cost (€m)	Total (€m)
PLEXOS Modelled Constraints for 12 Months		79.0m	
			79.0m
Specific Transmission Constraints			
	Radially connected wind	0.2	
	Moyle NTC fixed D-2	0.0	
			0.2
Specific Reserve Constraints			
	Turlough Hill	4.1	
	Replacement reserve	4.8	
	Increased regulation at night	0.6	
			9.6
Market Modelling Assumptions			
	Block loading in EPUUC	1.1	
	Single ramp rate in EPUUC	1.4	
	Hydro limitations	0.2	
	Generator constraints	0.4	
	Trips during generator run-up	1.5	
	Within-day testing	0.0	
			4.6
Perfect Foresight Effects			
	EPUUC - perfect foresight	6.6	
	Wind - variability and forecastability	9.3	
	Moyle schedule set D-1	0.5	
			16.4
Other factors			
	Wind - Curtailment	4.9	
	Moyle: SO-SO trades	-0.5	
	Transitional issues	5.0	
	Participant behaviour	0.0	
	Uninstructed imbalances	0.0	
			9.4
Total Forecast 2008			119.2
Total for 11 month Revenue Submission			109.3

Key Risk Factors

There are a number of other risk factors that could have a significant impact on the level of constraint costs. The main factors are highlighted below to inform readers of the nature of these risks and potential mitigation measures. These factors have not been accounted for in the total constraint forecast but could potentially result in a significant deviation from these constraint forecast if they arose.

High Impact, Low Probability Events (HILPs)

In respect of the constraint forecast, HILPs are rare transmission, generation or interconnector outages that lead to significant increases in constraint costs. For example, a long term, unplanned outage of a critical transmission circuit (e.g. due to a fault on a H.V. cable which could have a long lead times to repair) may result in generation being constrained until the repair can be completed. PLEXOS does include planned transmission and generator outages in the model but these tend to be co-ordinated and timed to minimise their impact on constraints. Forced outages are also modelled to account for some unplanned events. PLEXOS will therefore account for some constraint costs associated with outages but not major HILP events. In such an event involving transmission equipment, the TSOs would obviously seek to implement mitigation measures as soon as possible.

Market Anomalies

Unknown or unintended results from the market scheduling software could lead to unexpected market schedules which form the baseline from which constraints are paid. It is expected that any major anomaly would be quickly identified and corrected to prevent major constraint costs arising.

Participant Behaviour

It is difficult to see from the current vantage point how participants may behave in the new market in terms of their bidding strategy. The PLEXOS modelling process has assumed that participants offer according to their fuel costs and technical availability. The role of the market monitor in monitoring the behaviour of participants and acting in a timely manner will be important.

Significant Fuel Price Variations

The fuel prices used in the PLEXOS modelling process are based on a 'medium' forecast of long term fuel prices as produced in September 2006. Recent experience would suggest that there is significant volatility in some fuel prices. A general increase in fuel prices would lead to higher generator running costs and hence higher constraint costs. Divergence in the relative price of fuels could also lead to increase in constraint costs. Similarly, a reduction in fuel prices could lead to a reduction in constraint costs.

Poor Generator Availability and/or Generation Station Closure

A reduction in the overall availability of generation could lead to an increase in constraint costs as relatively more expensive generation may be required to provide reserve and system support in areas with transmission constraints.

Constraints Recovery

The TSOs have jointly prepared this forecast estimate of constraint costs and provided it to AIME as it has been determined that AIME Imperfections Charge is the appropriate vehicle for recovering constraint costs in the new market on an all island basis. AIME has no control over constraint costs.

There will always be many key assumptions underpinning any analysis to derive an estimate of constraint costs for a future period. In this specific case the uncertainty over these assumptions is increased as the analysis is examining the constraint effects in a market that does not yet exist and some of the details of which are still in the process of consultation and development.

[The remainder of this section has been removed on grounds of confidentiality]

Annex 1 PLEXOS Modelling and Assumptions

PLEXOS has been used for some years now as part of the SEM All-Island Modelling Project work supported by the TSOs. PLEXOS is a production costing model that can produce an hourly schedule of generation, with associated costs, to meet demand for a defined study period. By varying the data that PLEXOS considers, the impact on the generation schedule, and hence production cost, can be assessed. The main categories of data that feed into the PLEXOS model are summarised below.

The Transmission Networks – The lines, cables and transformers operated by SONI and EirGrid. PLEXOS allows for outages of this equipment (i.e. the equipment being out of service), the addition of new equipment, decommissioning of old equipment and equipment up-ratings. Defined time periods of availability/non-availability can be set for these items.

Generation/Interconnection - Detailed representations of all generators (and the Moyle interconnector) including ramping rates, min and max generation levels, start-up times, reserve capabilities, fuel types and heat rates are modelled. As with the transmission network, outages of generators as well as commissioning of new generators and decommissioning of old generators can be represented.

Demand – Hourly variations in system demand can modelled down to the appropriate supply point.

Fuel Prices – The price of the various fuels used by the generators (gas, oil, coal, distillate) is modelled, these can vary by time.

Detailed below are the key assumptions used in the PLEXOS modelling process:

General

Feature	Assumptions
Study period	The study period is 1 January 2008 to 31 December 2008
Constraint payments	Constraint payments are paid on the difference between constrained and unconstrained generation production costs
Study resolution	Each day consists of 24 one-hour trading periods
Fuel prices	Fuel prices are based on the Pöyry fuel price report to EirGrid (September 2006). Carbon costs have been added to fuel prices.

Transmission

Feature	Assumptions
Network Load Flow	DC linear network is implemented.
Ratings	Winter, Summer and Autumn ratings determined for all plant based on the Planet database and planning data provided by SONI.
Reinforcements	All transmission reinforcements contained in Planet are implemented.
Interconnection	North-South interconnection is part of the transmission system in SEM. However, it is still necessary to model NTC, which is assumed to be 300 N-S, 200 S-N. Moyle modelled – 400 MW import capacity, 80 MW export capacity at all times.
Scheduled Outages	Scheduled outages modelled based on provisional outage plans
Forced Outages	Not modelled.

Demand

Feature	Assumptions
Nodal Demand Representation	Load Participation Factors (LPF) are used to represent nodal demand. Distinct LPFs have been calculated for winter and summer months to account for seasonal variations. LPFs represent the load at a particular network node as a fraction of the total system demand. Thus, the load at every network location will have the same hourly profile as the system demand.
Hourly Demand Data	An hourly demand profile is used for the years 2006 – 2010 which is based on RoI and NI Forecast Statement data and takes the following into account: Embedded Generation (excluding explicitly modelled wind) Transmission Losses
Generator House Loads	These are accounted for implicitly by entering all generator data in exported terms
Industrial Load	Large industrial loads are explicitly modelled as constant demands.
‘Unserved’ energy and ‘Dumped’ energy	Can arise due to PLEXOS optimisation process. Production cost assigned to unserved energy and dumped energy to avoid skewing results.

Generation

Feature	Assumptions
Production Costs	Piecewise linear heat rates, using the Fan Approximation No Load costs Start Costs
Generation Constraints	The following general generation constraints are implemented: Maximum Capacity Minimum Stable Generation Minimum up/down times Ramp up/down limits
Scheduled Outages	Provisional outage schedules used to represent maintenance outages.
Forced Outages	Monte Carlo simulation used by software to determine forced outages based on Forced Outage Rate and Mean Times to Repair. FOR figures based on historical data.
Embedded Generation and Wind	All wind explicitly accounted for using three locational wind time series for all units on island. Installed wind by end 2008 over 1,600 MW. An aggregate embedded generation profile (non-locational) is used to account for embedded generation which is not explicitly modelled and is offset against the demand.
Hydro Generation	Hydro units modelled with monthly energy targets. Other hydro constraints (such as drawdown restrictions and reservoir coupling) are not modelled.
Turlough Hill	Modelled as a single plant with four units. Usable reservoir volume is 1,290 MWh. The efficiency of each unit is 70%.
Security Constraints	Since a DC linear load flow is used, voltage effects are not directly captured by PLEXOS. Also, contingency analysis is not performed by PLEXOS. In order to model security constraints in PLEXOS, ‘Proxy’ constraints have been implemented.
Multi-Fuel Modelling	Only one fuel is modelled for each generating unit.
Kilroot Modelling	Kilroot units 1 and 2 are modelled in coal firing mode only.
Gas Contracts/Constraints	Gas contracts and/or gas constraints are not modelled as information is not available to model these in a consistent manner for all units.
Peat	The priority dispatch status of peat units is effected by assuming their output is offered at €/MWh.
Aughinish Alumina CHP	Modelled as must run by offering capacity at €/MWh.
Moyle	Modelled as generator/demand with price of €/MWh

Ancillary Services

Feature	Assumptions
Operating reserve	Primary, secondary, tertiary 1 and tertiary 2 reserve requirements have been modelled. No specific increase requirement due to wind has been modelled.
Reserve characteristics	Simple straight back and flat generator characteristics.
Reserve sharing	Current arrangements assumed to continue.
Static sources	Static reserve provided by both Interruptible Load (STAR) and Moyle.