



I-SEM Programme: Stocktake Report

Prepared for the SEMC, October 2016

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Issued: 22 November 2016

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1. Executive Summary

The I-SEM Programme is currently running to a Go Live date of October 2017. When this was a little more than 12 months away, the SEMC asked that a stocktake exercise be conducted, to identify design and delivery risks associated with the I-SEM programme, and to formulate a recommendation relating to whether an October 2017 Go Live should still be pursued.

ESP Consulting has now completed this exercise, and prepared this report for the SEMC. We acknowledge the significant progress being made by the many parties, across the multiple areas, in a highly complex programme. However, we also note that there are unacceptable risks in proceeding to the current timeline, in particular, associated with the challenges for industry readiness.

On this basis, we recommend that I-SEM delivery is de-risked through reprogramming, with the following objectives:

- the central systems and processes which support the I-SEM energy market are targeted to be delivered by end 2017;
- this will support a four month energy market trial (running in parallel to the existing SEM) starting in January 2018;
- the first CRM auction is due to take place in December 2017; and
- the I-SEM energy market is then planned to Go Live during May 2018.

The reprogramming will:

- align all delivery activities within the I-SEM Programme, addressing serious challenges in the CRM pathway and providing additional contingency throughout for all parties;
- maintain a focus on delivery of central systems and processes during 2017;
- increase market participant confidence in the Go Live date and thus facilitate their commercial, organisational and systems delivery and readiness activities; and
- support parallel SEM operation, and I-SEM energy market trialling, to afford participants extended time for commercial testing and readiness, thereby reducing risk at Go Live.

Background to the recommendation

The I-SEM Stocktake focused on two areas:

- I-SEM design risk ('will the solution work in line with the baseline design'); and
- I-SEM delivery risk ('can the programme be delivered in the proposed timeframe').

The Stocktake included a comprehensive review of both RA and TSO delivery plans. In addition, a sample of Market Participants were interviewed to determine their views on design and delivery risks, and the results of the Market Participant Readiness Survey published in September 2016 were also taken into account.

In terms of **I-SEM delivery risk**, the Stocktake concluded that the I-SEM Programme has delivered well to date. Much has been accomplished despite its overall complexity, involving multiple parties, a large number of workstreams in each, and an intricate web of interdependencies. Successes include:

- development of the I-SEM market design, and based on this, completion of the system design specifications;
- development and publication of the I-SEM Test Strategy, setting out the overall approach to testing;
- completion of the design and governance arrangements for the NEMO¹;
- successful completion of the EUPHEMIA trail;
- establishment of the four participant liaison groups, and of the readiness reporting arrangements;

¹ Nominated Electricity Market Operator

- completion of Tranche 1 of the changes to the TSO and MO licences; and
- enactment of the requisite primary legislation for I-SEM in both jurisdictions

Other activities that are continuing substantially to plan include:

- the development of the Trading and Settlement Code; and
- the build programme for the central systems.

However, whilst recognising this success, we have also identified four 'Significant Pathways' of work that need to be completed for I-SEM Go Live but which, in our opinion, include significant risks associated with delivery against the existing timeline. These are:

- Market coupling: whether the agreements between RAs, NEMOs and TSOs in GB, NI and Ireland, and subsequent activities necessary for the delivery of ex-ante markets, including trialling, can be completed for Go Live;
- CRM: whether activities leading up to the CRM auction will complete on time, and allow the auction to be completed sufficiently far in advance of I-SEM Go Live to manage transition to the new market;
- Testing: whether the overall test programme for I-SEM is sufficient both in time and scope to establish the completeness and robustness of the delivered solution and thus the security of Go Live and subsequent operation; and
- Participant readiness: whether the participants will have completed the full programme of system delivery, commercial and operational readiness activities to allow their participation to the extent necessary in I-SEM.

The analysis of these four Significant Pathways, and associated risk, is presented in Section 3.1. Of particular note:

- the current timelines for delivering the first CRM interim auction are tight, to the extent we believe they are not achievable. Work is already progressing to compressed timescales and any delay to tasks in this workstream would make it impossible to have a CRM auction sufficiently ahead of Go Live of the ISEM energy market to facilitate forward energy contracting. The risks associated with this workstream make such a delay highly likely;
- the failure to deliver a market coupling mechanism amounts to a failure to deliver the entire market, and the ability to deliver such a mechanism depends on reaching agreement with a number of stakeholders in GB. Getting agreement with GB-based parties is an external dependency to delivering under our timescales which puts a risk on project delivery. Meeting this challenge may mean adapting elements of market systems design, which in turn will require more time than available in the current plan;
- the TSOs' testing timescale is very tight. Despite timescales being compressed (e.g. including a twelve week market trial – the absolute minimum for programmes of this type) there is only allowance for one week of slippage before Go Live would have to be delayed. Testing is organised, in line with best practice, into phases; a delay in one phase would delay the start of all subsequent phases; and
- participants need to set up clearing bank relationships in order to be ready for Go Live. This is required in order to trade in ex ante markets, and the time this takes is driven by the NEMO-recognised clearing banks themselves (none of whom are Irish banks). It is quite conceivable that a small participant may require 12 months to achieve such a relationship due to the need to agree credit risk provisions. This represents a significant risk to I-SEM as a whole, where there is a significant proportion of small participants. It may soon be too late for all of these to establish the clearing bank relationships essential to their participation in I-SEM ex-ante markets.

In addition to the above, there are a number of delivery risks not associated with one of the four Significant Pathways. First, there are risks arising from the development of legislative and legal frameworks, and in particular, the remaining changes needed to the Generation and Supply Licences, which could develop into a

threat to timely I-SEM delivery. These are currently contained, but will require ongoing and specific attention.

Secondly, there exist other areas of delivery risk which we believe can be contained given ongoing and specific attention. These areas relate to:

- progress reporting;
- participant engagement;
- resource availability;
- the Go / No Go decision process; and
- overall quality assurance.

Considering the overall risk picture, we conclude that the levels of risk inherent within the I-SEM Programme (particularly within the Significant Pathways) place considerable doubt over the achievability of an I-SEM Go Live date of October 2017. In addition, fixing any one Significant Pathway will not resolve this issue; all four need to be addressed in parallel.

In the light of this, the report recommends that some I-SEM delivery activities and milestones are reprogrammed, in order to address these risks. This reprogramming would result in the following revised milestones:

- the central systems and processes which support the I-SEM market would be targeted to be delivered by end 2017;
- this would support a four month energy market trial (running in parallel to the existing SEM) starting in January 2018;
- the first CRM auction would take place in December 2017; and
- the I-SEM energy market would then be planned to Go Live during May 2018.

The reprogramming would thus:

- address serious challenges with the CRM timescales. The timescales associated with CRM are significantly challenging and with a number of tasks likely to complete later than scheduled in the current plan. This late completion would mean that the CRM is extremely unlikely to be ready for the planned October 2017 Go Live of the energy market;
- add contingency to other workstreams: Re-calibration of the Go Live date to feasibly accommodate the work required on CRM would introduce contingency into other high risk areas of the I-SEM programme. This is needed as:
 - the I-SEM programme is currently running with limited or no contingency;
 - the additional time required for completion of the CRM work would allow contingency to be introduced into the other three Significant Pathways at risk (Market Coupling, Testing and Participant Readiness), thus reducing the likelihood of further impact on the Go Live date; and
 - this would also provide additional contingency for Participants to prepare their commercial, operational and systems readiness.
- increase confidence in Go Live date: Certainty over the actual 'Go Live' date has a significant impact on forward contracting by Participants. Specifically, participants are likely to be more willing to enter into I-SEM based forward energy contracts around a date they believe in.

In undertaking this reprogramming, it should be noted that:

- this is not a uniform slippage of all programme delivery activities to a later time – by default, current timescales will be maintained for activities where possible (for example, the existing systems build timescales, and timescales for publication of the Transmission and Settlement Code), and thus the overall pace of the programme;
- contingency will be added into the plan in order to minimise the risk of any further slippage; and

- a 'Stage Gate' process will be introduced into the programme in order to maintain momentum towards each of the four major market events: the FTR auction, CRM auction, commencement of market trial, and I-SEM Go Live. The RAs will publish further details of the 'Stage Gate' process, including overall governance, the criteria for each gate, and contingency plans, by 1Q2017.

In proposing this reprogramming, we suggest that it will:

- align all delivery activities within the I-SEM Programme, addressing serious challenges in the CRM pathway and providing additional contingency throughout for all parties;
- maintain a focus on delivery of central systems and processes during 2017;
- increase market participant confidence in the Go Live date and thus facilitate their commercial, organisational and systems delivery and readiness activities; and
- support parallel SEM operation, and I-SEM energy market trialling, to afford participants extended time for commercial testing and readiness, thereby reducing risk at Go Live.

From a **design risk perspective**, we recognise that the overall I-SEM design is sound. However, we also recognise that during a market transition such as I-SEM, there is always a level of associated risk. We have identified two key areas of design risk and believe that, in each case, the risk is manageable:

- cascading markets and security of supply: cascading markets from day-ahead through to delivery will be introduced in I-SEM. These will have the effect (amongst other things) of refining the planned operation of generation plant in Ireland. This is a significant change from the current centrally despatched pool of the SEM, creating risks (at least initially) relating to matching generation output to demand. We believe this risk is manageable given the TSO's ability to operate the Balancing Market whilst the Intra-Day market is still open, but believe it would be prudent to allow an increased reserve margin during the transition to the new market; and
- potential financial distress from uncertain prices as market is introduced: introducing new energy markets is normally associated with an initial period of high price volatility. In the extreme, this volatility could impact the solvency of some market participants. Participants are free to enter into contracts to manage this risk; albeit it may be prudent to intervene to encourage such contracting for an initial period.

We have also reviewed the I-SEM testing approach. While we have already mentioned the Testing Significant Pathway from a delivery perspective, we have also examined testing and assurance from a design perspective. Testing will be carried out by the TSOs under current plans and we believe that the approach taken to assure the I-SEM design is fit for purpose, albeit it would benefit from scrutiny of specific test scenarios and scripts by the RAs and participants. In addition to the testing of I-SEM systems, we recommend that the market rules are prototyped to increase confidence that they work as desired.

Finally, in this report we have assessed the alignment of the I-SEM programme with the DS3 programme in Section 5. This is important specifically from the perspective of CRM, where a similar procurement approach (i.e. auction-based) is envisaged for System Services in future. In making an assessment, we have recognised that different options exist for aligning Capacity and System Services procurement. These cover the design of auctions and qualification, as well as any local security of supply issues that need to be resolved. With the exception of the last of these (where the RAs recognised the need to take a decision and have confirmed a solution based on Net Going Forward Costs) the issues have largely been superseded such that:

- procurement alignment can and should occur after I-SEM Go Live; and
- new plant bidding into T-4 auctions would benefit from clarity over how the total DS3 System Service tariff based revenue is expected to change over the coming years.

2. Background and Approach

2.1. Background

The SEMC has identified that it is timely to carry out a Stocktake of the I-SEM programme. This commenced in June 2016, in parallel to the publication of the CRM3 decision. The Stocktake is focused on identifying both the design risk, and the delivery risk, inherent in the current I-SEM programme. This report sets out the findings of that Stocktake.

Considering the I-SEM delivery risk ('can the programme be delivered in the proposed timeframe'), the Stocktake has included:

- an examination of the current programme and plan and its expansion to reflect the shift into system implementation and market readiness phase;
- an assessment of the risks to Go Live by Q4 2017 and the ability / means by which such risks could be mitigated; and
- the proposed approach to the Go / No Go decision, including governance and decision criteria.

In reviewing the I-SEM design risk ('will the solution work in line with the baseline design'), the Stocktake has sought to address three key questions:

- is the overall design for I-SEM comprehensive and fully integrated?
- how should the integrity of the overall design, and the delivered systems which support it, be assessed and assured? and
- how does the proposed design for System Services within DS3 align with I-SEM CRM proposals?

In addition, the Stocktake has reviewed the design and delivery risk for the System Services component of the DS3 programme (henceforth 'DS3'), and its alignment with the I-SEM programme.

2.2. Approach

The Stocktake has been undertaken over the summer of 2016, culminating in this report to the SEMC meeting in September 2016. The Stocktake has been undertaken primarily by Alistair Green and Helen Mounsey of ESP Consulting.

The Stocktake originally focussed on RA programme delivery activities. However, it rapidly became apparent that the findings of the Stocktake would not be fully representative of the totality of I-SEM and DS3 design and delivery risks, without the involvement of the TSOs (in their delivery role), and the market participants. The Stocktake was therefore expanded to include:

- more detailed discussions with the TSOs to establish the key pinch points in the current delivery programme, the levels of risk associated with these (probability and impact), and any mitigation activities;
- a range of activities to seek market participants' views on design and delivery risk. These included:
 - a targeted programme of interviews with market participants, focusing on their views of the risks to their own delivery and readiness activities, linking back where justified to the I-SEM and DS3 delivery programmes. Interviews were conducted with a range of market participants during August / September 2016. The interviews were conducted by ESP Consulting independent of RA input. They took the form of a free format discussion, allowing participants to raise what they saw as the most significant design and delivery risks within the programme. The interviews were completed on a confidential basis, with the findings aggregated and anonymised for inclusion in this report. However, the majority of participants have confirmed that they would be willing to discuss points

further on an attributed basis should this be helpful in clarifying and confirming any information in this report;

- consideration of a range of correspondence received from both the EAI, and from market participants, during the period of the Stocktake; and
- the outcome of the first Participant Readiness Survey which was run by the TSOs (co-incidentally) during the Stocktake, and provides a broader overview of market readiness.

The full co-operation of the TSOs, and the market participants, in the Stocktake is gratefully acknowledged.

2.3. Structure of this Report

The remainder of this report is structured as follows:

- Section 3 summarises the Significant Pathways of delivery activities through the programme, and the key risks associated with each of these;
- Section 4 reviews the key risks remaining within the I-SEM high level design, and associated baseline documentation;
- Section 5 sets out the findings of our review of the System Services component of the DS3 programme, and its alignment with the I-SEM programme; and
- Section 6 presents our recommendations arising from the Stocktake, and the next steps to address these.

In addition, four appendices are provided:

- Appendix A provides more detail on the Significant Pathways and the risks within these;
- Appendix B summarises the key points raised in the participant interviews on the perceived risks inherent within the I-SEM programme delivery;
- Appendix C summarises the most significant I-SEM design points queried by participants. Whilst these are not thought to present a design risk as such, they will be followed up by the RA's Design Authority; and
- Appendix D provides comparative experience from other markets.

3. I-SEM Delivery Risk

3.1. Significant I-SEM Delivery Pathways

The Stocktake has been asked to establish whether the I-SEM programme can be delivered within the required timeframe. In theory, in order to assess the level of delivery risk in any programme, and thus determine whether it is likely to meet its target milestones, it is necessary to determine the critical path – i.e. the linked sequence of activities which together represent the longest overall duration, and thus determine the earliest project delivery date. Assessing the risk in these activities meeting their delivery timelines should then provide an understanding of whether the programme will deliver on time.

The I-SEM programme is an extremely complex delivery challenge, involving multiple parties, a large number of workstreams in each, and a complex web of interdependencies. In practice, the programme does not easily lend itself to critical path analysis, due to its overall complexity and thus the challenge of determining precisely what the critical path is at any time. Instead, we have developed the concept of Significant Pathways through the programme, all of which have to complete if the Go Live date is to be met. Successfully addressing the risk in any one Significant Pathway is simply likely to mean that one of the others becomes critical to Go Live.

In completing the Stocktake, we have identified a significant number of pathways on which the delivery activities which have either completed, or are continuing to plan. Completed activities include:

- development of the I-SEM market design;
- based on the above, completion of the system design specifications;
- development and publication of the I-SEM Test Strategy, setting out the overall approach to testing;
- completion of the design and governance arrangements for the NEMO;
- successful completion of the EUPHEMIA trail;
- establishment of the four participant liaison groups, and of the readiness reporting arrangements;
- completion of Tranche 1 of the changes to the TSO and MO licences; and
- enactment of the requisite primary and secondary legislation for I-SEM in both jurisdictions.

Other activities that are continuing substantially to plan include:

- the development of the Trading and Settlement Code;
- the build programme for the central systems; and
- development of the approach and plan for the Market Trail.

However, based on our review of the RA, TSO and participant delivery plans, we consider there are four Significant Pathways which taken together include the most significant risks to I-SEM delivery:

- **Market coupling:** whether the agreements between RAs, NEMOs and TSOs in GB, NI and Ireland, and subsequent activities necessary for the delivery of ex-ante markets, including trialling, can be completed for Go Live;
- **CRM:** whether activities leading up to the first CRM interim auction will complete on time, and allow the auction to be completed sufficiently far in advance of I-SEM Go Live to manage transition to the new market;
- **Testing:** whether the overall test programme for I-SEM is sufficient both in time and scope to establish the completeness and robustness of the delivered solution and thus the security of Go Live and subsequent operation; and
- **Participant readiness:** whether the participants will have completed the full programme of system delivery, commercial and operational readiness activities to allow their participation to the extent necessary in I-SEM.

The remainder of this Section 3.1 summarises the key risks in each of the above pathways. A more detailed diagrammatic representation and risk assessment of each is included at Appendix A.

Although the Significant Pathways noted above capture the majority of risk we consider is inherent within the I-SEM programme delivery, a small number of others exist. Some of these are standalone risks, unrelated to the above Significant Pathways. Others are underlying or overarching risks to programme delivery which pervade all Significant Pathways. These are covered in Section 3.2.1.

Finally, in Section 3.2.2, we identify some areas of the I-SEM programme in which we believe the level of risk is manageable, is not on any Significant Pathway, and (absent any dramatic levels of change) should not therefore impact on the Programme's overall ability to meet the planned Go Live date.

3.1.1. The Market Coupling Significant Pathway

The Market Coupling Significant Pathway includes all activities to put in place the required agreements for trading between the I-SEM and GB in day-ahead and intra-day timescales. This is a fundamental requirement for I-SEM Go Live for a number of reasons. The main drivers for the I-SEM programme are:

- to improve the efficiency of energy trading within the SEM / ISEM area and cross border trading, especially given increased interconnection with GB. Efficient usage of interconnectors is therefore key; and
- to achieve compliance with the European Third Package and target model.

This pathway has limited float – with testing due to complete one month ahead of market go live. A key risk in achieving this is that all arrangements will need to be agreed with parties outside the I-SEM (e.g. Ofgem and National Grid in GB) who may take longer to provide that agreement. The legislation relating to the Third Package sets out that any market coupling arrangements have to be agreed between the Regulators and Transmission System Operators (and NEMOs) for the markets being coupled.

Achieving this agreement is the key risk, as there are a large number of areas where agreement is needed and the resources required to progress these are already constrained. A number of factors highlight that work is required to achieve this agreement, and that timescales are challenging:

- early meetings have identified a number of issues that will need to be resolved to obtain this agreement, with a plan being developed to resolve these issues in a mutually satisfactory manner by early 2017; and
- NGC has a fixed six month 'window' for systems development, which presents a significant timeline risk for market coupling. If agreement cannot be reached soon with NGC on the interim capacity calculation method to enable specifications to be provided to NGC for the required changes to their systems by October 2016, this will lead to a six month delay.

At first sight these timescale impacts could be mitigated by accepting any position proposed by GB counterparts; however, this may not be efficient for the I-SEM design, and may need consequential changes to I-SEM systems that could themselves impact the I-SEM Go Live date.

As well as achieving the necessary cross-border agreements, this area also includes the development of NEMO arrangements. The NEMO has contracted EPEX and ECC to perform trading platform and clearing services respectively. The implementation of these services depends on regional coupling with GB and any changes to those coupling arrangements as they are agreed with GB Regulators and TSOs.

From the above discussion, ESP Consulting believes there is a high risk that the necessary cross border agreements for market coupling will not be achieved for the planned Go Live date. Discussions with GB counterparts are at an early stage, and we do not know the detail of the issues to be resolved. If those issues cannot be resolved quickly the planned Go Live date could only be met by accepting the GB position, and that acceptance not having a consequential impact on the timescales for I-SEM developments.

3.1.2. The CRM Significant Pathway

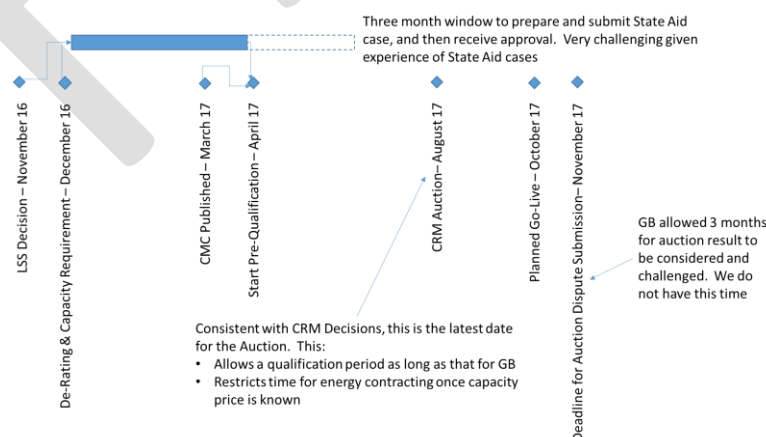
The CRM Significant Pathway includes all activities which need to be completed by the RAs and TSOs in order to allow the first CRM auction to be held². These include:

- the completion of the Capacity Market Code (the CMC);
- obtaining State Aid clearance;
- provision for participant accession to the CMC;
- publication of the Derating and Capacity Requirement factors, and the CRM parameters;
- publication of the CRM Interface specification, and the subsequent conduct of Participant Interface Testing;
- provision for participant qualification, including the resolution of any disputes; and
- conduct of a mock CRM auction.

The CRM Significant Pathway is subject to significant risk to the extent that ESP Consulting believes it is highly unlikely that the CRM could ‘Go Live’ in time for energy market Go Live in October 2017. This is illustrated in Figure 1, based on the timescales for GB Capacity Auctions (see Appendix D). Key observations on Figure 1 are:

- the timescales for achieving State Aid clearance are extremely compressed. Whilst there is a time limit (of a few months) for the European Commission to raise questions with a submission, in practice, the process can be considerably longer. That notwithstanding, meetings with the European Commission to date have been positive, and they are indicating that they will meet our deadlines;
- the programme has slipped as a result the additional Local Security of Supply Consultation and the deferment of the parameter consultation;
- the start of pre-qualification is dependent on the finalisation of the Capacity Market Code. The timescales for this are already challenging – with highly compressed timescales for consultation; and
- there is no scope to compress the timescales following State Aid clearance and the finalisation of the Capacity Market Code:
 - the timescales for the I-SEM CRM (see Appendix A) have already been compressed relative to those for GB; and
 - it would be beneficial for the first CRM auction to be further in advance of Go Live than the two months provided in CRM Decision 3. A significant number of participants will not enter into forward energy contracts until the Capacity price is known.

Figure 1: Key events relating to CRM Go Live



² Note the participant activities which are needed to allow them to take part in the first CRM auction are covered in the Participant Readiness Significant Pathway

3.1.3. The Testing Significant Pathway

The Testing Significant Pathway includes all activities that permit sufficient testing of the overall programme for I-SEM in terms of both time and scope. This will then ensure that the delivered solution is complete and robust. These activities include all elements of TSOs' testing, as well as the subsequent market trial.

The TSOs' test strategy has been published and includes several areas of testing, each of which has a set of dates on the pathway (see Appendix A.3). The different areas of testing include:

- Certification testing;
- Factory Acceptance testing;
- Site Acceptance testing;
- E2E testing;
- Integration testing;
- Participant Interface testing;
- Performance testing; and
- Technical testing.

Once these areas of testing are complete, the market trial can commence. Timings around this market trial are already compressed and challenged for a number of reasons:

- ideally, a significant number of participants should have developed and tested their own systems for the start of the market trial. It is highly unlikely that this will be the case, given the timescales for that development and its dependency on the (only recently published) draft T&SC; and
- at twelve weeks, the market trial is the absolute minimum that is acceptable for programmes for this type. A more typical minimum is three months (thirteen weeks) with provision for an additional month should issues arise in the trial.

While the risks on this pathway have not yet led to any delays to the project plan, the timescale does not allow for any material delays to any testing stream. Of particular concern, and demonstrating this point vividly, is that the final test completes on 26 May 2017 according to the current plan; this is six days before the start of the market trial. The test pathway cannot, therefore, allow for more than around a week of slippage across its many milestones without having further impacts on the market trial.

From the above discussion, ESP Consulting notes that the testing critical pathway is highly fragile, with no float in the plan to cope if significant issues arise in testing or market trial. This represents a high risk to successful Go Live of the I-SEM. This could lead to Go Live being delayed at short notice, which would significantly disrupt energy trading activities.

3.1.4. The Participant Readiness Significant Pathway

The Participant Readiness Significant Pathway includes all the activities which participants need to complete in order to be ready to go live. These activities group into three broad workstreams:

- commercial readiness;
- operational readiness; and
- systems and interface delivery.

Of the above, we consider that commercial readiness presents the most significant risk to participant Go Live. Risks pertaining to systems and interface delivery were also raised by a significant number of participants. Both these areas are explored in more detail below.

A number of participants noted risks associated with operational readiness (for example, organisational restructuring, staff recruitment, retraining and changes to T&Cs). However, we believe these are relatively lower in both probability and impact, and are thus not on the Significant Pathway to participant readiness.

Participant Commercial Readiness

There are a number of areas where participants face challenges in their commercial preparations for I-SEM Go Live. The most significant of these are:

- **Participant clearing bank relationships:** The I-SEM requires participants to trade in the day-ahead market, and envisages they will also trade through the intra-day markets. In each case, these markets are operated by a NEMO, with that NEMO requiring that participants have appointed a clearing bank. There is a significant risk that small participants may not be able to achieve such a clearing bank relationship for Go Live³. The time this takes is largely driven by the clearing banks themselves, of which there are a limited number, and none of which are Irish banks;
- **Novation of existing PPAs:** There are a number of contracts for the sale of power under the I-SEM that will continue post I-SEM Go Live. These contracts will need to be adjusted to have the same commercial effect under the I-SEM. For this area:
 - **REFIT Cash-out dependence:** A large number of contracts that need to be novated are for renewable plant contracted under REFIT⁴. This re-negotiation is delayed pending decisions from the Irish Government (DCCAE) on the cash-out arrangements for these REFIT contracts under I-SEM.
 - **Experience from NETA / BETTA:** A similar process of contract novation was required as the England and Wales electricity pool switched to the NETA⁵ market. Similar to the I-SEM change, this was a move from a pool to a market where parties traded in advance of delivery, with any differences between those trades and metered flows being settled through a balancing market. This contract novation proved highly complex, with none of the NETA market prices having the same commercial effect as those from the pool. Those involved at the time report those negotiations typically took in the order of six months to reach resolution or deadlock. In a number of cases, the process ended up in the courts, with some taking up to two years after NETA go live to resolve. In each case, contracts had been novated or reached deadlock before the NETA go live.
- **Additional energy contracting:** For a number of reasons, no energy contracts for forward delivery are currently being traded to cover the period after I-SEM Go Live (albeit one participant is trying to sell). Generators have stated that they are waiting clarity on capacity price (ultimately arising from the CRM auction) to determine the balance of revenue required from the energy market – and hence the price at which they are prepared to sell in forward markets. Participants have identified three significant risks to their readiness to trade in this:
 - participants have noted the accelerated development of the Capacity Market Code over a cycle of only four Rules Working Groups, the short consultation period for the CMC, and the very high number of consultations running in parallel throughout 4Q16, leading to ‘consultation overload’. As a result, they consider there is a significant risk that they do not fully understand the provisions of the CMC and the policy decisions underpinning it, and thus how the capacity market will operate in practice;
 - participants have noted that the preparation of their bids for the capacity market will depend on the detailed requirements of the CMC, and be based on significant modelling. This modelling will, in turn, be based on the de-rating factors, capacity requirements and CRM parameters. On current

³ One participant reported having taken a year to establish an equivalent clearing bank relationship for trading out of the mature market of London, whilst a larger player reported the process as having taken six months. The longer timescales are associated with the extra time to assess and agree the credit risk of smaller players.

⁴ REFIT is the Renewable Feed in Tariff, the measure used to recover the increased costs of renewable generators from customers as a whole. This ‘increased costs’ is determined relative to the assumed market revenue of the generator.

⁵ ‘New Electricity Trading Arrangements’. These arrangements were later extended to Scotland and became the British Electricity Trading and Transmission Arrangements - BETTA

- plans, this information will not be available until four months ahead of the auction. More than one participant has claimed this timescale to be challenging; and
- contracts to manage wholesale price risk at and beyond Go Live are essential to manage the impact of turbulent prices that typically follow the introduction of a new market. Whilst the regulators can impose some such contracts, there is still a need for more contracts entered into voluntarily by participants. At present, no contracts are being traded beyond Go Live. The key piece of information that is blocking this trade is the capacity price, which, participants believe, will impact their view of future energy prices. The two-month window between the CRM auction and Go Live is too tight for this contracting.

When combined with the risks inherent within the CRM Significant Pathway noted in Chapter 3.1.2, we consider it prudent to allow more time for CRM as a whole, and for subsequent energy contracting.

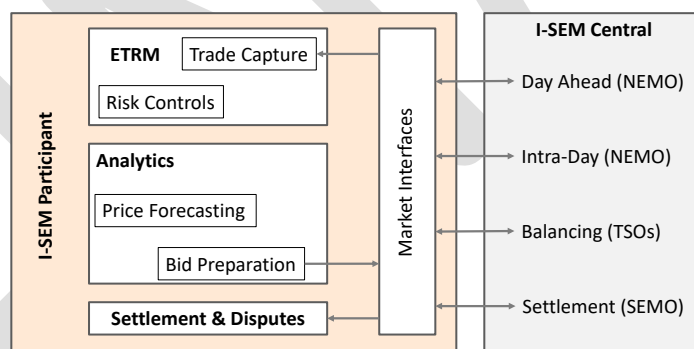
From the above discussion, ESP Consulting believes it is possible (given available resources) for participants to be commercially ready for the planned I-SEM Go Live. However:

- this will require a lot of preparatory work such that contracts are substantially re-negotiated by the time factors affecting participants view of energy price become clear;
- the timescales for finally agreeing contracts (following capacity auctions) are tight; and
- the resources required for such readiness are also critical to other areas of participant I-SEM preparations – meaning they are constrained.

Participant Systems Delivery

Considering systems and interface delivery, Figure 2 sets out a generic I-SEM systems architecture:

Figure 2: Simplified architecture for I-SEM Participant



Many participants confirmed the need to invest in significant upgrades to all elements of their systems, interface and data architecture in order to support the additional complexity of the I-SEM. However, they noted that:

- the T&SC forms the baseline document against which to procure replacement systems, and thus agree a contract for delivery. Whilst procurement of replacement systems can start based on currently available material, it cannot be completed until the legal draft of the T&SC is published for consultation in November, without introducing the risk of subsequent change and thus additional costs;
- most participants are subject to the Utilities Procurement Directive, and the processes and associated timescales this imposes on their purchase of replacement systems (for example, the need for standstill periods prior to contract award);
- whilst solutions are available which meet the requirements of similarly complex international markets (particularly in the USA), none of these are currently deployed in Ireland / Northern Ireland. We understand a number of vendors are actively considering entering the Irish market, and who suggest they can potentially deliver solutions which meet the I-SEM requirements within the required timescales; and

- there is a growing shortage of skilled and experienced resources able to undertake implementations of this nature (particularly taking account of the novelty of the proposed solutions in the Irish market, the complex requirements dictated by I-SEM, and the short timelines for delivery which preclude extensive training programmes).

The baseline I-SEM delivery plan allows a seven month window between the publication of the draft T&SC, and the start of Market Trials (by which date participants must have procured, designed, built, and tested all systems and interfaces).

We agree with participants that this is an extremely challenging timescale for a major programme of systems and interface delivery, particularly when the products on which this is based are only just coming into the Irish marketplace. We also agree with participants who have suggested a more realistic period of 12 to 18 months to complete this activity.

However, we also note the option to implement alternative, simpler, architectures⁶ in time for Go Live which could mitigate this delivery risk (albeit at increased commercial risk). **Therefore, whilst it is important, ESP Consulting does not consider systems and interface delivery to be an insurmountable obstacle on the Participant Readiness Significant Pathway.**

3.2. Other Delivery Activities

This section covers other delivery risks which merit mention, but do not fall on any of the above Significant Pathways:

- Section 3.2.1 sets out activities we consider to present a high risk to timely I-SEM delivery; and
- Section 3.2.2 addresses activities which are perceived by one or more delivery party to be of high risk, but in our view, are mitigatable and of a lower threat to timely programme delivery.

3.2.1. Activities of Concern

The following paragraphs highlight a number of areas that present a high risk to timely I-SEM delivery, and which do not fall on any of the Significant Pathways discussed in Section 3.1. These are risks that can be managed, but which will require on-going and specific attention. These risks relate to:

- the legislative and legal framework; and
- other programme and project management risks;

The Legislative and Regulatory Framework

We have identified two risks related to the establishment of the legislative and regulatory framework for I-SEM which are currently contained, but could develop into a threat to timely I-SEM delivery:

- completion of the Trading and Settlement Code; and
- completion of the changes to the Generation and Supply Licences.

The Trading and Settlement Code (T&SC) is being developed through a highly structured and collaborative programme of Rules Working Groups (RWG), involving the RAs, TSOs and participants, leading for a full legal draft available for review from the end of August. The RWG work is nearing completion, and a consultation on the legal draft of the Consolidated Rules Document (comprising the draft I-SEM rules (including Agreed Procedures), existing SEM rules and the Transitional rules) is planned to be launched on 11 November 2016. Following a six week consultation period, and a further eight weeks for analysis of responses, the final version of the T&SC is scheduled to be published on 15 March 2017.

⁶ For example, the Type 2 instead of Type 3 option for market communications, and spreadsheet based solutions for analytics.

Participants have reported concern at the level of open issues remaining with the T&SC. As at the 26 August 2016 RWG, there were a large (400+) number of issues recorded as 'Open' by the TSOs with the T&SC and its development. However:

- there is significant duplication of issues within this list;
- a number of issues reflect a general lack of comfort with the rules, rather than specific issues;
- the majority of the significant issues have actually been resolved, with this resolution not being reflected in the issues log; and
- issues do remain; however the policy position on these issues is clear, or will be shared with industry as soon as possible. Notably, this includes the following:
 - confirmation of how TSO to TSO trades will contribute to balancing prices. This will be confirmed once the arrangements for market coupling are agreed; and
 - the rules do not incorporate the agreed arrangements to prevent capacity providers making difference payments if they are providing a DS3 System Service (e.g. Reserve) that prevents them from providing capacity. Whilst not in the rules, the policy is clear – as is the fact that the rules will incorporate this.

We consider there are two risks in this timeline:

- the T&SC consultation is likely to run in parallel to that for the CMC, and in the run up to Christmas. A large number of participants are concerned that they will not be able effectively to review the document within that time period due to significant resource constraints; and
- the widespread participant concern (noted above) about the a large number of unresolved issues in the RWG process could give rise to a significant volume of responses to the T&SC consultation, reflecting real or apparent concerns over the code contents. Analysis of these (together with the consequent need for any amendment to the draft T&SC) could delay publication of the final version of the code.

The consultation on the proposed changes to the Generation and Supply Licence changes⁷ is currently delayed from its scheduled September launch date. This delay results both from resource constraints within the RAs, and also the publication of the F&L2 decision, which is likely to introduce additional conditions into the Generation Licences. Two risks have been identified to the timely publication of the licences (the effective date) for I-SEM Go Live:

- the licence consultation was planned to be published by 1 November 2016, in order to provide for the 11 month appeals period to complete in time for I-SEM Go Live; and
- participants have noted that they are being asked to review the proposed licence conditions in advance of publication of the T&SC and CMC, to which the conditions refer. Logically, we do not consider this to be a significant risk (since the licence condition is very high level, and any objections to the detail contained within the T&SC or CMC can be covered through those consultations). Nonetheless, this apparent misalignment is leading to significant participant concern, and the increased risk of a challenge during one or more of the various consultation processes.

We consider the first of the two risks above to be the most significant. Whilst current plans show it can be contained, any further slippage could directly impact on I-SEM Go Live in the event of any challenge to the licence process.

Programme and Project Management Risks

We have identified a number of underlying risks relating to programme and project management which have potential to impact on the timely delivery of I-SEM:

⁷ this consultation is the balance of changes required to the Generation and Supply licences beyond those already covered in the already completed Tranche 1 (the changes need to facilitate the introduction of the capacity market, and thus which had to be completed on an earlier timeline).

- progress reporting;
- participant engagement;
- resource availability;
- the Go / No Go decision process; and
- overall quality assurance.

We consider that the underlying project management processes operated by the RAs and TSOs are appropriate for the I-SEM programme. These processes include:

- governance, where the hierarchical structure flowing down from the SEMC, and including the I-SEM Steering Group, the Joint Project Board, and the RA Project Board, is providing proper levels of scrutiny and approval of decisions appropriate for a project of this nature;
- planning, where a hierarchical approach based on Level 1, 2 and 3 milestones provides an overview of the project (Level 1), management of milestones which impact on two or more parties, and thus dependencies (Level 2), and scope to develop detailed plans internal to any one party (Level 3);
- risk and issue management, where risk registers are held at both programme and project level; and
- baseline management, where all changes to any material (including both documentation and plans) which impact on two or more parties are subject to a documented change control process.

However, we note and agree with the widespread view amongst participants that the approach to **progress reporting** needs to be reviewed. In particular, participants query:

- the accuracy of reporting, particularly when milestones slip (often by considerable periods, with no apparent impact on subsequent milestones), or suddenly change status (e.g. from green to red a matter of days before delivery); and
- the usefulness of reporting. The hierarchical approach to programme planning which has been adopted means that progress is reported against Level 2 milestones (milestones which impact on two or more parties), but not against the lower level activities which are the responsibility of only one party, but which contribute to the overall achievement of that shared milestone. Thus if Level 2 milestones are some period apart in time, there is no reporting of interim progress, and this is undermining participant confidence in overall programme delivery⁸.

The TSOs are responsible for **participant engagement**, and in particular, processes such as:

- running the various participant liaison groups;
- administering the query management process;
- maintaining a central calendar of events, and a central repository of key documentation; and
- conducting the Participant Readiness Survey at intervals.

Whilst participants value these activities, they consider they are not an adequate channel to capture overall participant feedback. In addition, they suggest that the TSOs' focus on delivery is largely at the expense of any concern over participant progress. We note and agree with their views that the RAs should take a more active and structured role in participant engagement, to provide a channel independent of the TSOs, and through which overall I-SEM delivery and design concerns can be raised for further discussion.

A common theme throughout the majority of participant interviews was that of **resource availability**. Most participants noted that internal resources are already significantly stretched by the need to understand the proposed I-SEM design, and consider its commercial, organisational and legal implications. This is a particular issue in smaller participants, where their I-SEM teams are often only of the order of five or so staff,

⁸ By way of an example, the Level 2 milestones relating to the delivery of central systems (i.e. those milestones which directly impact on participants) are the publication of interface specifications (8 July 2016), and the start of interface testing (23 January 2017). The TSOs' design, build and test activities between these milestones are internal to their own plan, and not subject to I-SEM reporting. There is thus a gap of c. six months in the plan during which there is no requirement to report on progress in central systems delivery. We have asked the TSOs to consider how this particular instance could be addressed.

and who are also addressing DS3 delivery. In addition, participants have noted that skilled external resources are already scarce and relatively expensive.

The TSOs have also noted challenges in recruiting the required numbers of skilled and experienced resources to staff its delivery responsibilities. Finally, we consider there is significant risk that the RAs do not have sufficient resources to complete some key activities in a timely manner (e.g. publication of the CMC and the T&SC). Overall, we consider the option to throw increasing numbers of resources at I-SEM delivery to address other delivery risks and thus maintain progress will be increasingly untenable for the RAs, TSOs and participants, simply on the grounds of availability.

Participants are also concerned to understand the **Go / No Go process**, as this has largely been invisible to them to date. We welcome the RAs' recent publication of a statement setting out the overall approach to the process, including their intention to publish a more detailed information paper later this year on the governance, decision criteria and contingency measures for Go Live. Further Level 2 milestones should then be included in the Programme Plan to reflect this.

Finally, we note the request for independent **Quality Assurance** of the I-SEM delivery plan and programme management arrangements set out in a range of recent correspondence received by the RAs. This Stocktake is an important step in assessing the overall deliverability of the I-SEM Programme, and we strongly support participant views that the SEMC should reach and publish its decision as soon as possible. In addition, we have sought to demonstrate both professional integrity and independence in our conduct of the Stocktake, and will continue to do this in our delivery of expert programme management advice to the RAs. On this basis, we consider further independent QA is unlikely to add significant benefit at this point, provided the recommendations in this report (particularly relating to progress reporting and participant engagement) are fully implemented.

3.2.2. Activities of Manageable Risk

This section addresses three areas which are widely perceived to be a risk to I-SEM delivery, but for which we believe mitigation measures are in place.

Central Systems Delivery

In our conversations with the TSOs, they have indicated that they will continue to drive their vendors to deliver broadly in line with currently agreed dates. However, they recognise that current plans have limited or no float and that there may be commercial advantages in allowing more time.

In respect of this development, the TSOs have provided the following text:

'Delivering the central market systems and related TSO infrastructure involves multiple vendors. The following measures are being employed by the TSOs to support delivery to time, cost and quality:

- *Application of best-practice procurement processes for the selection of vendors.*
- *Ensuring that the commercial agreements with vendors are fully reflective of the time, cost and quality requirements of the I-SEM Project.*
- *Wherever practical and appropriate, utilising existing systems and vendor relationships to deliver necessary functionality.*
- *Support from experienced client-side advisors to bolster the TSOs' vendor management capability.*
- *Implementing best practise project management practices, including (but not limited to):*
 - *agreement of detailed plans;*
 - *documented quality process;*
 - *detailed status reporting against an agreed set of deliverables;*
 - *formal change control;*
 - *risk and issue management processes;*
 - *senior management oversight;*

- *close working between the TSOs' and vendor delivery teams; and*
- *appointment by the TSOs of an experienced on-site vendor delivery manager.*
- *Recognising the complexity of the I-SEM market design, developing system requirements to a higher degree of detail than might normally be expected and working closely with vendors over an extended period to ensure that the vendor has the necessary understanding to reflect those requirements faithfully in its designs. This process takes time, but the investment is considered essential in not only the delivery of the central market systems, but also in facilitating the delivery of all the interfacing systems.*
- *Ensuring vendors are cognisant of the Level 2 Plan and the importance of delivering to the milestones within it.*
- *Ensuring the I-SEM Project remains uppermost in vendor's plans.'*

RA Organisational Readiness

Aspects of the I-SEM design and operations are likely to require the RAs to change their ways of working. The RAs have not yet completed their detailed assessment of 'Day 2' changes required, and their plans to deliver these. These include:

- determining their ongoing role in market modelling and monitoring for the new I-SEM markets, understanding how these differ from current arrangements, and thus both planning and delivering the range of transition activities which are needed for organisation structure, staffing arrangements and information systems and data support; and
- determining how any changes to elements of the I-SEM regulatory framework (Trading and Settlement Code, Capacity Market Code and associated parameters) should be managed post Go Live. This includes a number of areas that are additional to those already performed for the SEM – such as the periodic review of new parameters, and the Capacity Market Code.

The work required in this area is manageable and does not give rise to a need to recalibrate dates. We recommend continuing focus on these activities, as the proposed organisational design and ways of working should be determined and put in place in time to be tested during the Market Trials.

4. I-SEM Design Risk

4.1. Introduction

As part of the stock-take, ESP Consulting has been asked to consider the following questions relating to the design of the I-SEM:

- is the overall design for I-SEM comprehensive and fully integrated?
- how should the integrity of the overall design, and the delivered systems which support it, be assessed and assured? and
- how does the proposed design for ancillary services within DS3 align with I-SEM CRM proposals?

The first two of these areas are separately considered through the following paragraphs, with the last one being considered as part of section 5

4.2. Overall Design of the I-SEM

We have formed our opinion on the overall design of the I-SEM in two ways:

- **RA Design Authority:** ESP Consulting has recently been appointed as Design Authority for the Regulatory Authorities. In this role, we have been reviewing the I-SEM design in terms of:
 - **End to End Coverage:** Comparing the end-to-end process for the SEM and other wholesale electricity markets with the design work for the I-SEM in order to identify potential gaps in the design;
 - **Overall Architecture:** The I-SEM design work has been carried out as a series of workstreams – each concentrating on a specific area of the design. This is a reasonable way to organise design activities, but does create the risk of certain design issues, at the boundaries between the parts designed by each workstream, being overlooked. Given this risk, the RA’s Design Authority is looking at how those parts fit together to form the entire design; and
 - **Highlighted issues:** In addition to the two diagnostic areas highlighted above, the Design Authority reviews design issues highlighted from within the RA’s I-SEM programme, or from its interaction with other major stakeholders (e.g. through business liaison groups). Primary responsibility to address such issues fits with the relevant work-stream, with the Design Authority having a more active role for issues that cut across more than one work-stream.
- **Participant Stocktake:** As part of this stocktake, ESP Consulting has interviewed a number of participants. In each case, those participants have shared their view of any issues they perceive with the I-SEM design.

This leads us to an opinion that the design of the I-SEM is sound. We note, however, there is concern from participants over some areas of the new market. In most cases, participants acknowledged this as nervousness relating to the transition to a new market. However, one participant raised concern over whether the market would actually work. We discuss the two most significant⁹ areas of concern in the following paragraphs. In each case, these relate to potential issues as the market is introduced, and participants adapt to that market. During this transition, there are two risks that need to be considered:

- that security of supply will be threatened; and
- that uncertain prices will lead to unmanageable financial distress for some participants.

A more complete list of the design issues raised by participants is presented as Appendix C.

⁹ The ‘Significant’ issues are those that have the potential significantly to impact the costs of operating the Irish power system, or on the solvency of specific participants.

The two areas discussed further below are:

- **Cascading markets and security of supply:** The EU target model is based on a cascade of markets from day-ahead through to delivery that (amongst other things) refine the planned operation of generation plant in Ireland. This is a significant change from the current centrally despatched pool of the SEM, creating risks (at least initially) relating to forcing generation output to match demand; and
- **Potential uncertain prices as market is introduced:** Changes to wholesale energy markets – such as that envisaged for the introduction of the I-SEM – are normally associated with an initial period of high price volatility. In the extreme, this volatility could impact the solvency of some market participants. This solvency can be protected through forwarding contracting – to cushion the impact of extreme prices.

4.2.1. Cascading markets and security of supply

The EU Target Model is based on a cascade of markets that, amongst other things, progressively refine the despatch of plant between the day-ahead market and the time of physical delivery. This is significantly different to the current SEM market – where a single party (the TSOs) determines which plant should generate based on a stable set of data relating to the costs and technical characteristics of that plant. This significant change is creating some nervousness amongst participants, with one questioning whether it will actually work.

As ESP Consulting, we note significant experience from elsewhere in Europe that markets of this type can and do work. However, we also note that:

- in the extreme, a market failure in this area could significantly increase the costs of maintaining the stability and security of the I-SEM power system; and
- in recognition of this risk, it is normal to be cautious in introducing markets. It is common practice to have transitional measures to ensure there is sufficient time and spare generation capacity for the System Operator (in the Balancing Market) to resolve any despatch issues that remain following the Day Ahead and Intra Day markets.

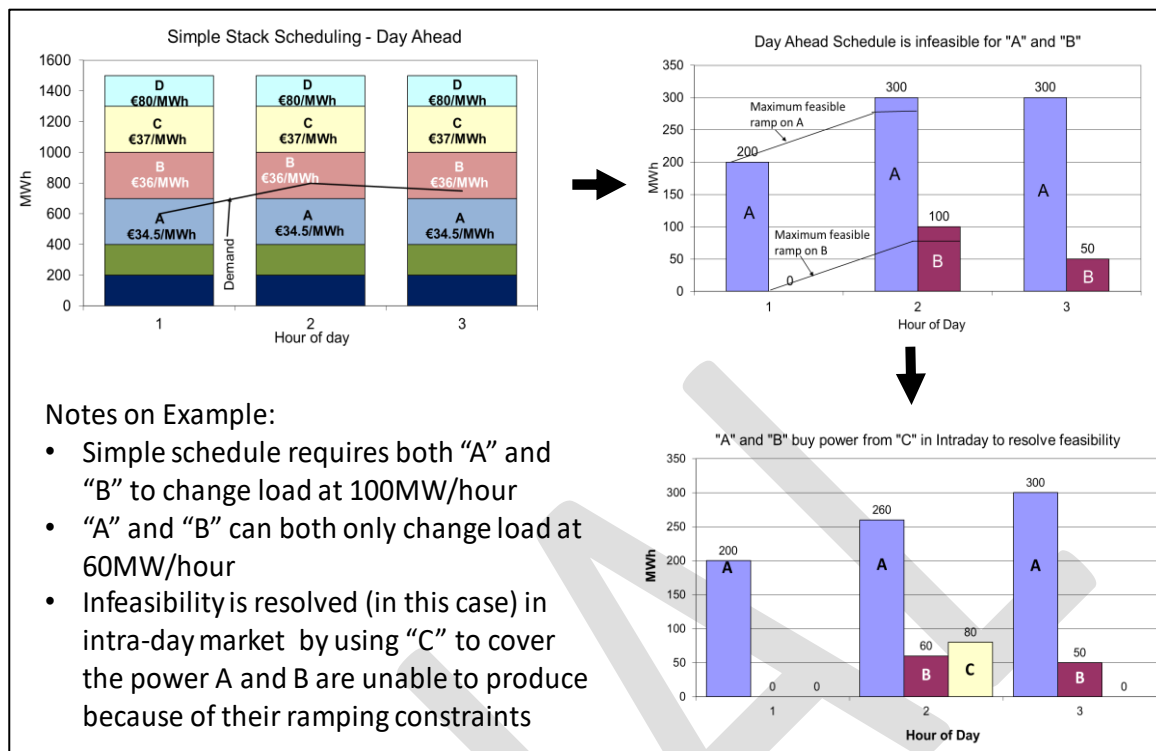
The risk of failure arises from two key areas:

- **The ability of the markets to predict the total quantity of output required from its generators.** This has a clear and significant impact on any difference between the plant mix required to match actual demand, and that bought by the market. In practice, after an initial period, other markets have typically evolved to perform reasonably well in this area – with participants quickly adapting their own forecasting capabilities.

A complicating factor for Ireland is uncertainty over where wind will choose to sell its output. Over time this will settle into an equilibrium; however, until that equilibrium is found, there is a risk that wind does not participate in markets until close to delivery – displacing a large amount of plant at short notice. The risk of this is, for wind generators in the Republic of Ireland, impacted by decisions yet to be taken relating to ‘out-of-market’ compensation for generators under REFIT.

- **The simplified nature of plant scheduling in the day-ahead and intra-day markets.** In the most extreme example this is based on ‘simple stack’ scheduling, where plant is restricted to pricing on a simple €/MWh basis, with no consideration of the need to run for multiple hours, or the fact that plant can take time to change load. This is the approach taken in Italy, and can lead to an infeasible schedule as illustrated in Figure 3 below.

Figure 3: Achieving a feasible schedule through day-ahead and intra-day markets



There are a number of factors that provide comfort that, after an initial period, the market will deliver efficient outcomes. Notably:

- as mentioned above, participants' ability to forecast customer demand, and trade to that demand, have evolved quickly in other markets;
- we would expect a similar learning pattern to apply to wind generators – increasing the stability and predictability of their participation in Day Ahead, Intra-Day and Balancing markets;
- the form of bids proposed for the I-SEM Day Ahead and Intra-Day markets are more complicated than those in the above example, allowing plant to reflect some of the technical constraints that impact their operation; and
- even with the simplest form of bids (as given in the example above), the Italian market has worked without major issue. The 'infeasibility' apparent at the day ahead stage is resolved through a series of intra-day auctions that are held every four hours between the day ahead market and delivery. It is proposed that the I-SEM will have a similar arrangement – based on three intra-day auctions between day-ahead and delivery supplemented by continuous intra-day trading.

The comfort of the above factors notwithstanding, ESP Consulting believes it prudent to:

- consider whether transitional measures are required to manage the risks discussed above as the I-SEM is introduced; and
- continue to require at least three intra-day auctions between Day Ahead and delivery.

Transitional measures for this area tend to fall into two areas:

- **Long gate closure:** Gate closure is initially set a 'long' time ahead of delivery to allow the System Operator more time to resolve differences between plant despatch arising from trading and that required to balance the system. For example, on the introduction of NETA¹⁰ in England and Wales, gate

¹⁰ NETA has subsequently been expanded to also include Scotland, at which time it became known as BETTA – the current GB wholesale electricity market.

closure was initially four hours¹¹ ahead of delivery, and moved to one hour ahead of delivery as confidence in the market increased; and

- **Enhanced plant margin:** Markets often adopt increased reserve margins for their initial years – leading to a higher capacity margin.

The I-SEM market design allows the balancing market to operate in parallel with the intra-day market – substantially ahead of gate closure. This acts to mitigate the risk that trading will not result in a mix of plant that matches demand – albeit at a potentially high imbalance cost. In addition to this, ESP Consulting considers that the transition to the I-SEM could benefit from the TSOs adopting an enhanced reserve margin. The ongoing need for this margin could then be kept under review on a six monthly basis – based on the how close ex-ante traded positions are to that required to balance the system.

4.2.2. Potential price volatility as transition to new market

Experience of the introduction of new wholesale energy markets suggest that market prices can be relatively unstable for the first six to 24 months - until the market finds an (at least initial) equilibrium. The typical policy response to this is to put in place contracts that insulate participants from price movements during these first months, or to rely on vertical integration to provide these contracts implicitly. These contracts fix the price that Suppliers pay to Generators for a substantial proportion of the electricity that is generated and delivered.

Similar measures may benefit market participants for I-SEM Go Live, notably because:

- the I-SEM represents a significant change in how plant is scheduled to meet demand – a factor that can drive price volatility as participants ‘learn’ the optimal way to behave in the market;
- the I-SEM includes a substantial number of non-vertically integrated players who will need contracts to ‘cushion’ the impact of price uncertainty during those early days; and
- for a number of reasons, there is limited or no trading to date of contracts to manage energy market price risk after the planned I-SEM Go Live. All participants we spoke with confirmed that no one is trading forward energy contracts beyond I-SEM Go Live, with both Suppliers and Generators awaiting the capacity price to inform their view of forward energy prices. Some generators reported trying to sell contracts, but that Suppliers were reluctant to buy until capacity and FTR prices were known. Participants claim they need to know the capacity price to be able to price forward accurately. Whilst it is possible that forward energy contracts could be put in place in two months, this is tight. The consequences of not having contracts are amplified in that prices tend to be more volatile in the early months of a new market.

The initial expected increased volatility implies the need for contracts. There are a number of factors to consider in addressing this need:

- the I-SEM programme has been exploring measures to facilitate such contracts and provide improved access to forward trading within the market as part of its ‘Forwards and Liquidity’ workstream; ;
- it is clear that a number of factors are acting to increase the risk in pricing forward energy contracts, notably that participants see a strong linkage between capacity and energy prices. This is a feature of the first I-SEM capacity auction – where there is significant uncertainty over the price of capacity that will result from that auction. This should be less apparent in subsequent years as a body of information on historic capacity prices is established; and
- Reliability Options are one way CFDs, and have the attraction of covering 100% of energy consumption. These will protect Suppliers against extreme price volatility based on the Reliability Option strike price (likely to be ~€500/MWh - based on the cost of Demand Response).

¹¹ Four hours was chosen as the length of time to get a ‘warm’ generation plant to full load

The above factors suggest that the best set of contracts that can be put in place to cover the risk of price shocks will be a combination of Reliability Options (covering 100% of demand) and energy forward contracts. This is then best delivered by:

- ensuring Reliability Options are in place for I-SEM Go Live (i.e. the I-SEM Capacity Remuneration Mechanism must go live alongside the I-SEM energy market);
- at least for an initial transitional period, pursuing some of the options suggested by the Forwards and Liquidity work stream; and
- holding the first Capacity Auction a reasonable number of months (i.e. 5+) ahead of the I-SEM Go Live, to allow for the establishment of other energy forward contracts.

4.3. Testing and assurance of the I-SEM Design

There are a number of elements to testing and assurance of the I-SEM design, notably:

- **Is the overall design OK?** Section 4.2 above sets out the approach we have taken to assure the overall design of the I-SEM, and the issues arising from that assurance. We note that one participant has requested a more substantial review of the I-SEM design supported by substantial modelling. There is also a participant request for the design to be reviewed by an independent panel of experts – similar to that used by UK Government for its recent Energy Market Reform. In respect of these participant views, we note:
 - no assurance effort will absolutely guarantee the detection of all issues with a design. Increasing the time and money spent on assurance will find more issues, but does suffer from the law of diminishing returns;
 - the design has been developed in consultation with the industry, who have also been part of Rules Working Groups scrutinising that design - albeit recent workload at the Rules Working Groups has inevitably impacted the level of scrutiny of rules by participants, and hence the level of comfort that can be derived from this process (see Figure 4 below);
 - the SEM and I-SEM governance already includes independent scrutiny of the design. The SEM Committee includes an independent member who is often supported by his alternate – who is also a member of the panel of experts appointed by UK government for the UK Energy Market Reform.
 - it is best practice for complex areas of market rules to be prototyped (using tools like Excel) to provide assurance that they work, and do not give rise to unintended consequences. This has not been done in the case of the I-SEM rules.
- **Do I-SEM systems deliver the design?** What testing is required to ensure that the systems being developed to deliver the I-SEM perform in line with the I-SEM requirements? Under current plans, this testing will be carried out by the TSOs, who have set out their high-level test strategy. The RAs already plan to have an assurance role for the development of test scripts and scenarios by the TSOs, and have asked the TSOs for evidence that (for late test stages in the TSOs' strategy)¹²:
 - the ultimate 'test scripts and scenarios' will exercise all areas of the legal requirements from codes and licences (mainly the rules embodied in the T&SC); and
 - that all major systems interfaces have been tested (e.g. from NEMO systems into settlement etc.).

The evidence being sought in this area is:

- a traceability matrix that links specific requirements through to systems and test cases;
- how that traceability has been used to form those specific test cases; and

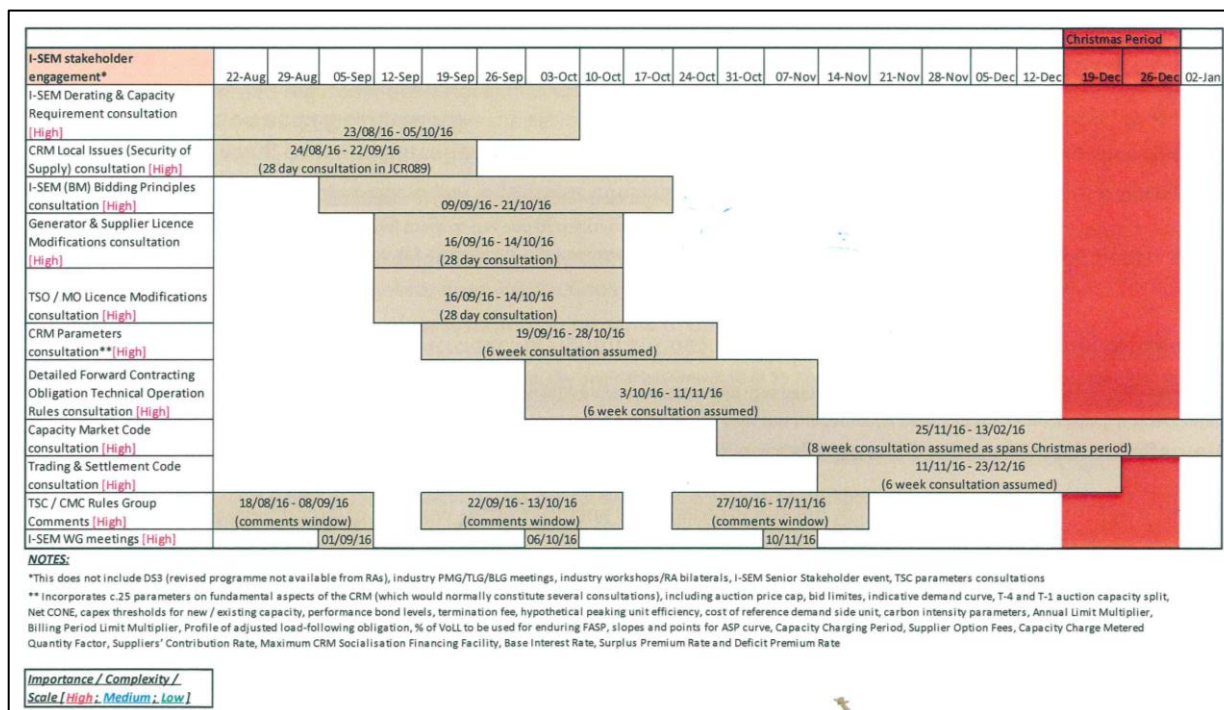
¹² These are 'End to End' and 'Certificate' testing phases – which test the I-SEM systems as a whole, rather than their individual components

- how 'boundary cases' (typically input data with zero or negative values) have been accommodated in test cases.

The confidence in this assurance of the TSOs' testing would be increased by allowing participants (alongside the RAs) to review those test scripts and scenarios along with the associated traceability matrices. In our discussions with participants, those that were concerned in this area:

- agreed that assurance activity should be focused on the areas already being targeted by the RAs; and
- would welcome the opportunity to contribute to that assurance.

Figure 4: Consultation & Rules Development timelines - taken from a participant presentation



Based on the above discussion, ESP Consulting concludes that:

- with the exception of prototyping of market rules, the approach taken to assure the I-SEM design is fit for purpose;
- prototyping of the market rules should be carried out to provide confidence that they work and do not have un-intended consequences (or that such unintended consequences are manageable); and
- testing will be required to ensure the I-SEM systems deliver the design, and that the RAs and participants should have a review role for the specification of the late test stages – to ensure all areas of requirements are adequately covered.

5. Alignment with the DS3 Programme

This section considers issues relating to the alignment between DS3 and I-SEM under two headings:

- how does the proposed design for DS3 System Services fit with the CRM proposals; and
- how do the schedules for the design and delivery of DS3 interact with that for I-SEM?

5.1. Design Alignment

Issues for how the proposed design for DS3 fits with the I-SEM CRM proposals relate to the arrangements for the procurement of capacity (through the CRM) and of System Services (part of DS3). These represent two of the three key revenue streams for I-SEM power plant:

- **Energy:** Revenue from generating and selling MWh of electricity;
- **Capacity:** Revenue from having the (MW) capacity to produce electricity; and
- **System Services:** Revenue for having the capacity to provide a number of services that are necessary to maintain the quality and stability of electricity supplies.

It is ultimately envisaged that both Capacity and some System Services¹³ will be purchased through contracts, with those contracts allocated through auctions. The key issues for the 'fit' between CRM and DS3 proposals relate to the alignment between these procurements. This has been considered by the I-SEM and DS3 design teams previously, who have noted that:

- **Co-procurement would seem to be an optimal solution – but there are issues:** There are advantages to Capacity being co-procured with System Services – through a common auction. This has benefits in terms of:
 - **Participant risk:** Reducing the risk to participants that they will not be awarded both Capacity and System Service contracts; and
 - **Optimal mix:** Delivering the optimal mix of plant which is awarded contracts.

As well as the above benefits, there are issues with this approach, notably:

- **EU Thinking:** EU Thinking is moving to procure reserve no more than 1 month in advance, significantly reducing the benefits of co-procurement alongside annual or multi-annual capacity contracts
- **Complexity:** Co-procurement is significantly more complex than procuring Capacity and System Services separately.
- **Separate Contingent Auctions also possible:** Whilst not as good as co-procurement, it is possible to purchase Capacity and System Services through separate auctions. These auctions would need to be relatively close together in time, and to include contingent bidding. This contingent bidding would mean that if a plant was successful in the first auction, but then failed in the second – it would withdraw its bid from the first auction, causing the outcome of that auction to be revised;
- **Qualification needs to be aligned:** The funding for specific power plant is likely to be based on assumed revenue for both Capacity and for System Services. As such, potential new build power station will want to qualify for both Capacity and System Services before participating in an auction. This is less of an issue if a generation plant qualifies to provide Capacity – as the Grid Code will require that plant to be able to provide System Services, significantly reducing the risk that it then fails to qualify to provide those services; and
- **Sufficient time is needed to resolve any Local Security of Supply issues:** It is possible that subsequent to one of the transitional T-1 Capacity Auctions, a plant that may decide to close if it is not awarded an RO

¹³ Competitive procurement will only be used for those System Services where there is judged to be sufficient competition

and this could, in turn, lead to issues with local security of supply. This may lead to a need for bilateral System Service contracts to prevent plant closing that is required for voltage support¹⁴. There needs to be sufficient time to resolve these issues between the capacity auctions and the point at which the relevant plant would cease to deliver the required services.

In practice, the issues relating to alignment of auctions and qualification have been superseded by events. The plans for DS3 System Services are now based on the development of enduring tariffs for each of the system services. Consideration of competitive (auction) based procurement of those services will not re-start until 2017, with any resulting auctions not happening until after I-SEM Go Live.

We believe this delay to consideration of System Service auctions is sensible, and allows the complex issues to be considered:

- in the context of a stable I-SEM; and
- at a time when appropriately skilled resources (RA, TSO and industry) are less constrained.

Our support for the above scheduling of auctions notwithstanding, we believe there is a need to provide some clarity over how DS3 System Service revenues will evolve (for example, to inform those looking to invest in new plant). Whilst annual tariffs will provide sufficient revenue certainty for the transitional CRM auctions, for the T-4 auctions it would be beneficial to publish a glide-path for how the total tariff-based revenue is expected to change over the coming years.

Based on the discussion above, ESP Consulting concludes that:

- ***the need to align DS3 and CRM procurement can and should occur after the I-SEM Go Live, meaning this does not impact the I-SEM Go Live date; and***
- ***that new plant bidding into T-4 auctions would benefit from clarity over how the total DS3 System Service tariff based revenue is expected to change over the coming years.***

5.2. Delivery Alignment

The DS3 Interim arrangements went live on 1 October 2016. These arrangements consist of using static interim tariffs (based on value based approach), manual performance monitoring approaches and new DS3 contracts procured through a central tender process. This includes the procurement of 11 of the 14 proposed System Services which has resulted in contracts for over 100 providing units. In parallel, DS3 SS Qualification Trial Process (QTP) will start to be carried out in 2017 to prove and to develop robust measurement approaches to prudently demonstrate the use of existing and new technologies for system services production. This QTP will also develop the necessary processes to robustly measure and process the data to include the 3 remaining system service products.

From an enduring arrangements perspective there is ongoing dialogue between the RA and TSO teams on the timing and approach to Regulated Tariffs, Auction design, Scalars and the full implementation of the SEMC DS3 SS decision. Some challenges of doing this work include the need for consultation on elements of regulated tariffs, automation of the performance monitoring process and the need for all of these in the absence of definitive timelines for auction go live. There is, though, an expectation that for 1 October 2017 the settlement of DS3 will include 14 products, allow for a greater range of technologies and some elements of the outstanding items included. In respect of a System Services Auction, the scope still has to be undertaken and no commitments can be made in respect of a date for this auction; however, it will be after the I-SEM Go Live date.

More generally in the wider DS3 programme there is good progress in developing and implementing in the control centres in Belfast and Dublin the necessary policies and tools to prudently operate a power system to

¹⁴ Such contracts would be of sufficient generation to allow an alternative and more economic form of voltage support to be provided – e.g. from investment in network assets.

75% SNSP by 2020. It is expected that 65% SNSP will be reached before ISEM Go Live. Of course there are practical issues in delivering numerous policies and tools (i.e. I-SEM and DS3) at once in the control centre, or anywhere for that matter, but these could be managed through proper sequencing and coordination. There are however some dependencies for future DS3 operational changes linked to I-SEM delivery.

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6. Recommendations and Next Steps

The decisions for the I-SEM programme delivery relate to whether the plans should continue to be based on an October 2017 Go Live date, or whether that date should be recalibrated. We have discussed the potential for any date recalibration with the TSOs, who have advised that we avoid a Go Live during the Christmas and New Year period in the face of reduced availability of resources.

There are three broad options for any re-calibration of dates relating to I-SEM Go Live:

- **No Change:** I-SEM planned Go Live is unchanged at October 2017;
- **Recalibrate by a few weeks:** I-SEM Go Live date is recalibrated to a few weeks later than originally planned. The extent to which this can be achieved is constrained by the TSOs' concern that Go Live should not happen during the Christmas and New Year period; and
- **Recalibrate by a number of months:** I-SEM Go Live is moved to 2018. This is a more substantive recalibration that allows us to avoid a Go Live over the Christmas and New Year period, and substantially de-risks a successful Go Live. Under this option, the bulk of TSO and RA activities would continue in line with the current target dates. However:
 - more time would be allowed for participants to establish a relationship with a clearing bank – as required by the NEMO appointed for Day Ahead and Intraday markets;
 - more time would be allowed for consultation on the Capacity Market Code;
 - more time would be allowed for the agreement of the market coupling arrangements with GB TSOs and regulators, as well as any consequential changes that may arise in obtaining that agreement;
 - capacity auctions could take place further in advance of Go Live, allowing more time for participants to then enter into contracts, as well as for any bilateral System Service contracts to be established (if required to maintain security of supply); and
 - the programme for testing central systems would have sufficient float to provide confidence that systems would 'pass' testing without causing delay to other areas of the programme.

6.1. Analysis of Options

The following paragraphs present our analysis of the benefits and risks associated with each of the above options.

6.1.1. No Change (October 2017 Go Live)

This option has a number of benefits, notably:

- **Third Package Compliance:** This option would deliver a set of trading arrangements that are compliant with the EU Third Package in line with the timescales agreed between Ireland and the EU; and
- **(Potential) reduced project costs:** Costs will continue to be incurred by the RAs, TSOs and participants through to Go Live. At first sight, this suggests that the total level of such costs are reduced the earlier the Go Live date; however, this may not be the case. Any remaining issues with systems and processes at Go Live would require ongoing work to resolve, as well as leading to increased operational costs (due to manual work-arounds).

The above benefits notwithstanding, this option is also subject to significant risk. In the opinion of ESP Consulting, the most significant risks are:

- **Market Coupling not agreed ⇒ Market cannot function:** Market coupling is fundamental to meeting the requirements of the EU Third Package. The I-SEM is built on the scheduling tools that sit at the heart of EU market coupling. Failure to agree the coupling arrangements would then mean:
 - the arrangements could not proceed in a way that would be compliant with Ireland's commitments to the EU;

- the market could not function (given its reliance on the EU scheduling tools) meaning that go live would have to be delayed (potentially at short notice).

EU law provides for market coupling arrangements between the relevant RAs, TSOs and NEMOs. Whilst this is a high priority for those focused on the I-SEM, it is less so for those whose primary focus is the GB market (e.g. Ofgem and NGC), albeit they also have legal pressures to agree acceptable arrangements for market coupling;

- **Market Coupling arrangements change to deliver agreement ⇒ Market systems need to change:** Whilst Ofgem and NGC face legal pressures to agree acceptable arrangements for market coupling, they are not obliged to accept the proposals that have been developed for the I-SEM. In obtaining their agreement, the design of those coupling arrangements may change in a way that necessitates changes to central market systems, and hence more time for their development;
- **Issues arise in testing ⇒ Go Live delayed at short notice:** The schedule for testing the I-SEM central systems is tight. Whilst the plan does allow some time for the resolution of bugs and the re-testing of the relevant areas, there is a significant probability that any issues in early testing phases will have knock on impact on future testing timescales (as would be the case for any testing programme). This would necessitate that more time is taken for testing leading to a delay to Go Live;
- **Delays to clearing banks ⇒ some Suppliers and Generators cannot participate:** There is a significant probability that some participants will not have established a relationship with a clearing bank for Go Live. This relationship is a requirement for them to sign up to the NEMO operating the Day Ahead and Intraday markets. This probability is significant given the number of smaller participants in the I-SEM and the small number of clearing banks recognised by the NEMO – none of which are based in Ireland;
- **State Aid clearance delayed ⇒ CRM cannot proceed or is delayed:** Whilst we believe there is a strong probability that State Aid clearance will be achieved for the CRM, the impact of any delay or absence of this agreement is so significant that it has to be noted. In practice, a no to state aid approval for the CRM as opposed to a delayed approval would be a 'showstopper' for the CRM (albeit the energy market could in theory proceed without the CRM);
- **CRM Systems and Codes delayed ⇒ CRM delayed and forward contracting disrupted:** The plans for the development of the systems and codes required for CRM auctions are very challenging. Any slippage in this timescale will delay the CRM auctions, and hence the time at which participants know the capacity price. This capacity price has a significant impact on participants view of forward energy prices – and hence any liquidity in forward energy contracts; and
- **Turbulent prices with limited forward contracting ⇒ Financial distress for some participants:** The introduction of new energy markets tends to lead to volatile prices, with participants being shielded from those price movements by forward energy contracts. The absence of those contracts could lead to financial distress for some participants. There are a number of factors that could frustrate the establishment of these contracts, notably:
 - the later the CRM auction, the less time there is to establish those forward energy contracts so the greater risk that contracts are not completed, leaving participants exposed to financial distress; and
 - participants need certainty over the go live date to enter into contracts. This certainty increases as the testing of central systems is completed, CRM State Aid clearance is obtained and the CRM and FTR auctions complete.
- **Short-notice delay ⇒ Disruption to forward energy and interconnector contracting:** In practice the first I-SEM related commercial activities occur months ahead of its planned Go Live, notably:
 - **FTR Auctions:** Auctions to sell Financial Transmission Rights (FTRs) in respect of interconnector capacity between the I-SEM and GB. These FTRs would start from I-SEM Go Live, and would replace (and have a different value to) the Physical Transmission Rights that are used under the SEM; and
 - **CRM Auctions:** Auctions to allocate Reliability Options to capacity providers. These Reliability Options would only work with reference to I-SEM prices, and hence will be structured and priced

based on an assumed I-SEM Go Live. Were the Go Live date then later than specified in the Reliability Options, these Options would either continue (meaning Capacity providers receive payment without the Reliability Option incentives to perform) or be unwound.

The other risks discussed above give a significant probability of a delay after one or both of these auctions¹⁵. This would create significant disruption, with a need to 'unwind' the contracts allocated through those auctions (or accept capacity providers receive payment without being exposed to performance incentives). In addition, it would mean Ireland had failed to offer effective contracts for interconnector capacity consistent with the timelines of the EU Target Model – placing Ireland (temporarily) in a position where it is less compliant with the EU target model than under the current SEM.

6.1.2. Re-calibrate by a few weeks

In practice, this option is little different to the option of retaining October 2017 as the planned Go Live for the following reasons:

- the risks inherent in the plan will not significantly reduce. Should those risks materialise, the consequential delay could easily exceed a few weeks; and
- a delay of more than 'a few weeks' becomes a delay of 'a few months' as from a practical point of view putting a market live over the Christmas / New Year period with reduced availability of key staff across vendors, markets participants, the TSO, MO and RA's increases the risk of the project. Also any resulting issues that may arise during the first few weeks of operation would have a higher impact during the higher demand period coming up to Christmas and New Year. While Go Live in this period is technically feasible it is certainly higher risk.

6.1.3. Re-calibrate by a number of months

Re-calibrating the Go Live date for a number of months has benefits in significantly reducing the risks highlighted for the October 2017 Go Live, notably:

- **Address serious challenges with the CRM timescales.** The timescales associated with CRM are significantly challenging and with a number of tasks likely to complete later than scheduled in the current plan. This late completion would mean that the CRM is extremely unlikely to be ready for the planned October 2017 Go Live;
- **Add contingency to other workstreams:** Re-calibration of the Go Live date feasibly to accommodate the work required on CRM would introduce contingency into other high risk areas of the I-SEM programme. This is needed as:
 - the I-SEM programme is currently running with limited or no contingency;
 - there are a number of other areas of the programme where timescales are subject to significant risk (for example agreeing the arrangements for market coupling with GB, and testing of the I-SEM systems). The additional time required for completion of the CRM work would allow contingency to be introduced into these 'high risk' areas, thus reducing the likelihood of further impact on the Go Live date; and
 - this would also provide additional contingency for Participants to prepare their commercial, operational and systems readiness.
- **Increase confidence in Go Live date:** Certainty over the actual 'Go Live' date has a significant impact on forward contracting by Participants. Specifically, participants are likely to be more willing to enter into I-SEM based forward energy contracts around a date they believe in.

The above benefits notwithstanding, there are also a number of costs to such a re-calibration. Notably:

¹⁵ The first FTR auction will take place six months ahead of Go Live.

- **Third Package Compliance:** This option would not deliver a set of trading arrangements that are compliant with the EU Third Package in line with the timescales agreed between the I-SEM Member States and the EU. Compliant arrangements will be delivered; however, they will come into effect after the date agreed with the EU; and
- **Project costs:** Costs will continue to be incurred by the RAs, TSOs and participants through to Go Live, albeit the costs of manual processes and work-arounds should be lower.

It should be emphasised that a 'date re-calibration' is not a uniform slippage of all programme delivery activities to the right. Detailed planning needs to be completed in order to confirm:

- the proposed revised Go Live date;
- activities which will remain substantially as currently planned. These include:
 - ongoing work on the T&SC, as this document is needed by participants as the basis for their systems build and test activities; and
 - the existing plan for systems design, build and test by the TSO, which should be maintained wherever possible. It is likely testing will require limited added contingency and thus extend the completion of the systems test programme, but we are advised by the TSO that the central systems can still be delivered and ready for Market Trial by the end of 2017;
- activities which need to be retimed either to address slippage or to provide additional contingency (as set out above). These include:
 - additional time in the CRM Significant Pathway, in particular to complete the Capacity Market Code, and also a change in the date of the first CRM Auction in order to increase the window between the it and I-SEM Go Live;
 - the extension of the Market Trial activity from three to four months to address participant concerns in this area, and reflect experience of similar programmes elsewhere (e.g. NETA);

6.2. Recommendation

The decisions for the I-SEM programme delivery relate to whether the plans should continue to be based on an October 2017 Go Live date, or whether that date should be recalibrated. We have discussed the potential for any date recalibration with the TSOs, who have advised that we avoid a higher-risk Go Live during over the Christmas and New Year period.

On the basis of the evidence set out in this report, and subsequent discussions with the RAs, TSO and the SEMC, ESP Consulting's recommendation is to:

- reprogramme the I-SEM delivery activities in order to address the risks identified in this report, such that:
 - the central systems and processes which support the I-SEM market are targeted to be delivered by end 2017;
 - this will support a four month market trial (running in parallel to the existing SEM) starting in January 2018;
 - the first T-1 capacity auction is due to take place in December 2017; and
 - the I-SEM energy market is then planned to Go Live during May 2018.
- publish the adoption of this option to industry so that they can accommodate it in their plans and manage the cost of their own developments towards I-SEM Go Live; and
- initiate detailed planning with a view to confirming a revised delivery plan by the end of October 2016, noting our caution above that this does not mean a uniform slippage of all activities to the right.

In undertaking this reprogramming, it should be noted that:

- this is not a uniform slippage of all programme delivery activities to the right – by default, current timescales will be maintained for activities where possible, and thus the overall pace of the programme;
- contingency will be added into the plan in order to minimise the risk of any further slippage; and
- a ‘Stage Gate’ process will be introduced into the programme in order to maintain momentum towards each of the four major market events: the FTR auction, CRM auction, commencement of market trial, and I-SEM Go Live.

We consider this will:

- align all delivery activities within the I-SEM Programme, addressing serious challenges in the CRM pathway and providing additional contingency throughout for all parties;
- maintain a focus on delivery of central systems and processes during 2017;
- increase market participant confidence in the Go Live date and thus facilitate their commercial, organisational and systems delivery and readiness activities; and
- support parallel SEM operation, and I-SEM trialling, to afford participants extended time for commercial testing and readiness, thereby reducing risk at Go Live.

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Appendix A Significant Pathways

As discussed in Chapter 3, we have defined four significant I-SEM Delivery Pathways. For each one, more detailed diagrammatic representations of the descriptions already mentioned are presented here, including:

- Description of task/milestone
- Corresponding delivery date
- Where appropriate, the details of the risk driver behind the task/milestone

These are presented using the same colour scheme as in the I-SEM Level 2 project plan, i.e.:

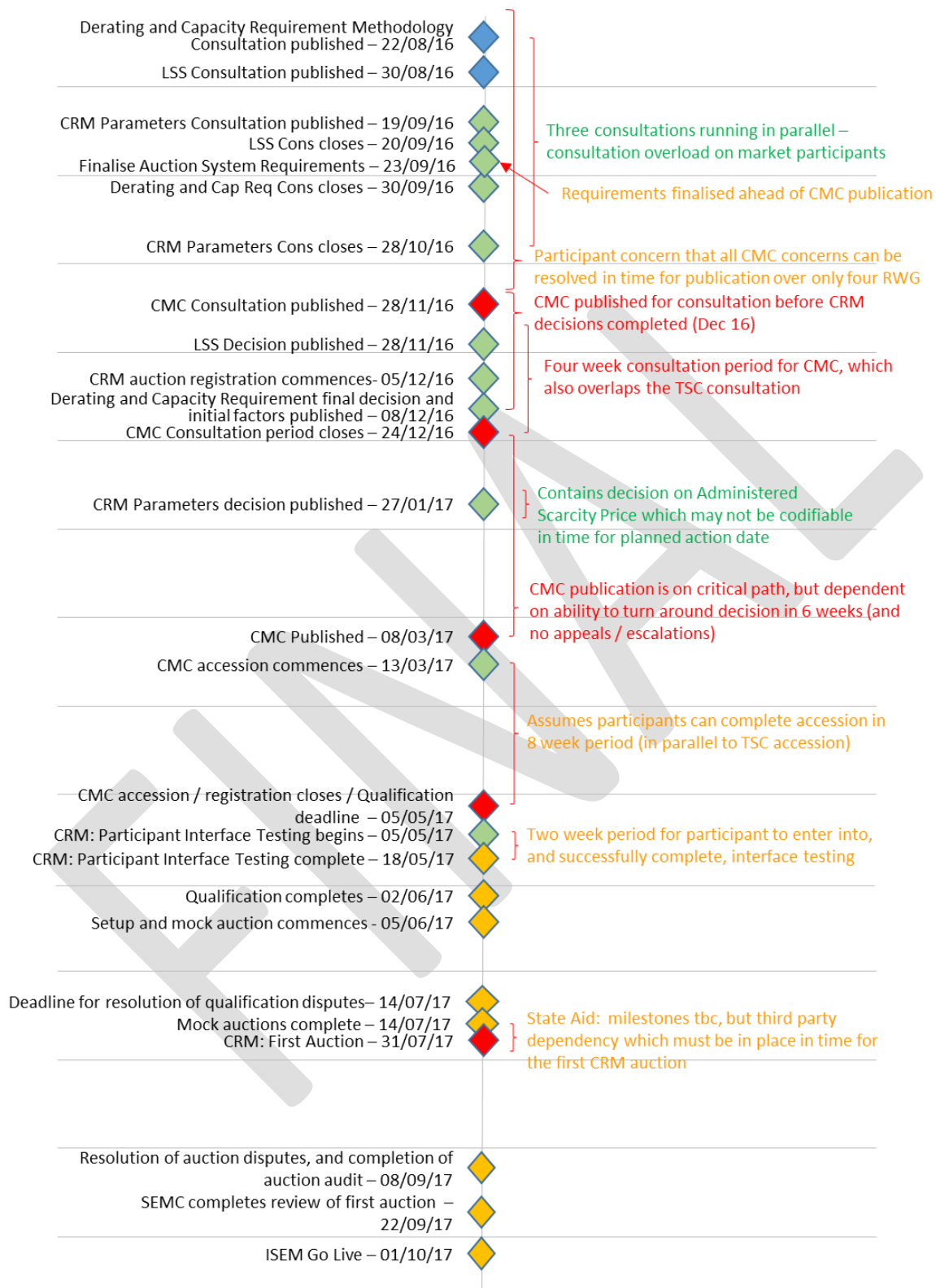
- Green – milestone on track
- Amber – milestone at risk
- Red – milestone will be late/new expected date

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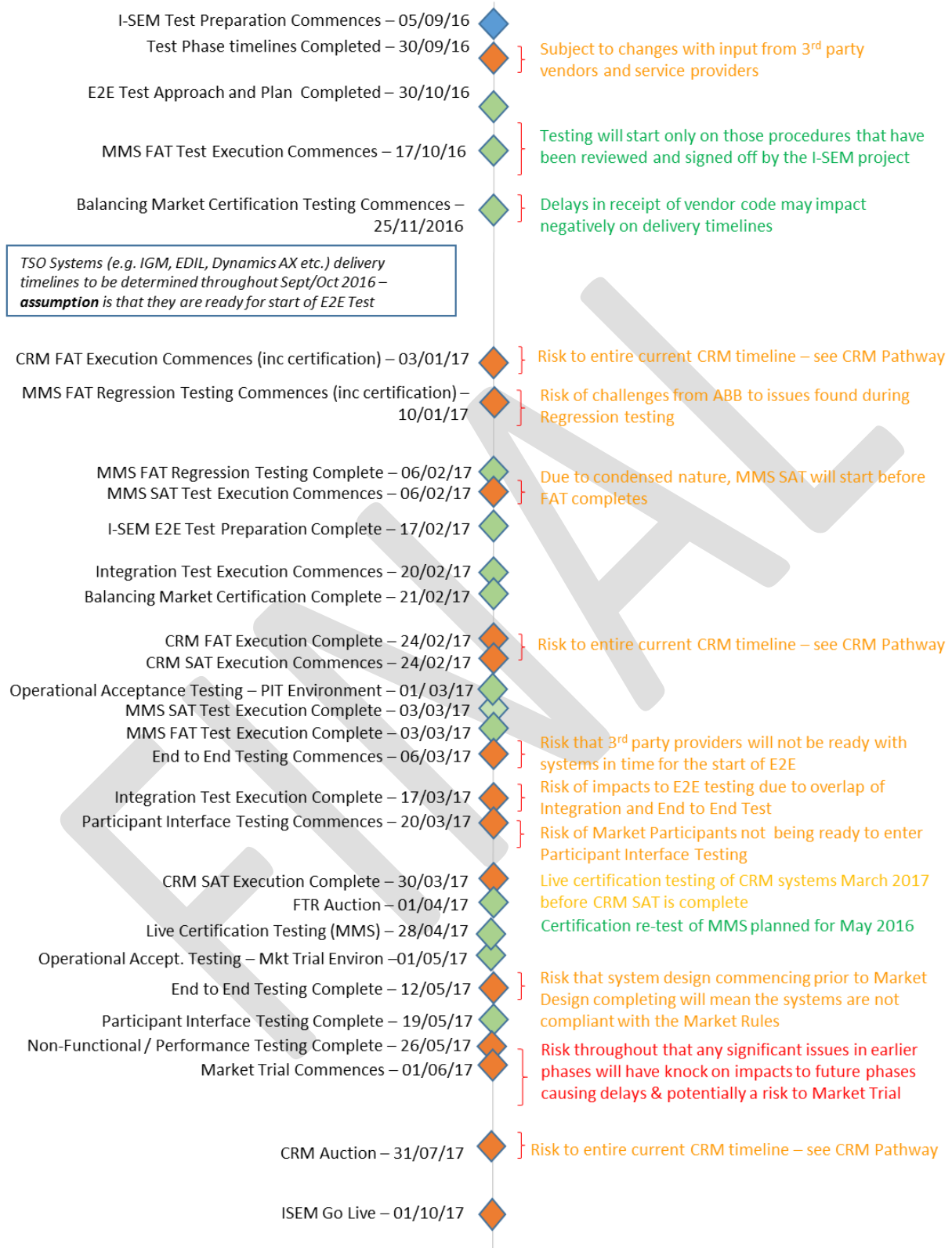
A.1 Market Coupling Significant Pathway



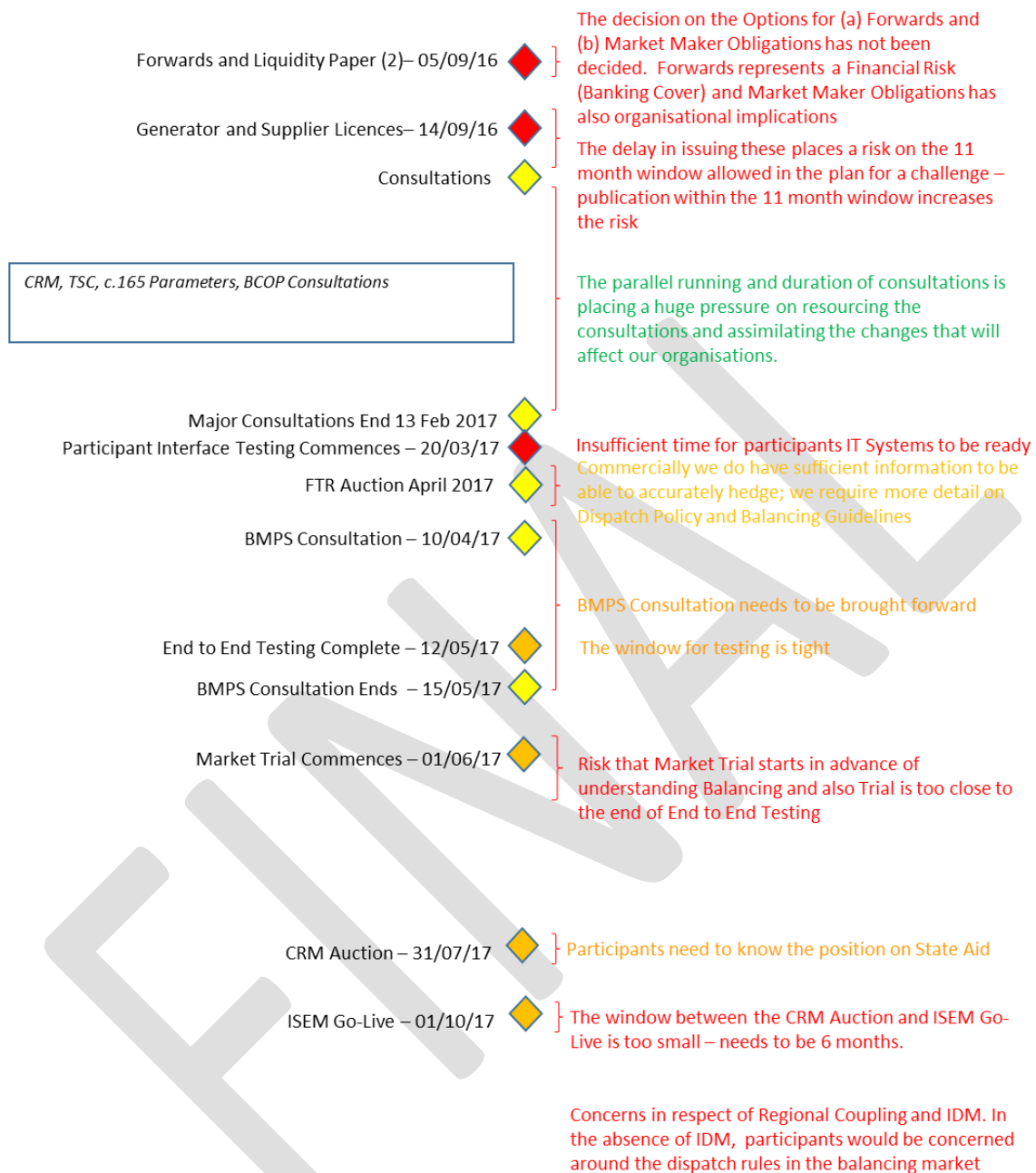
A.2 CRM Significant Pathway



A.3 Testing Significant Pathway



A.4 Participant Readiness Significant Pathway



Appendix B Summary of Participant Key Points on Delivery Risks

This appendix lists the key points raised by participants during the interview programme, relating to perceived delivery risks within the I-SEM Programme. These points are as raised during the interview, and are quoted without further interpretation by the interviewers / report authors. On the many occasions multiple participants raised broadly the same point, it is included only once in the list below.

The points are broadly organised under the following headings:

- Development of the I-SEM Design (noting that points raised relating to the I-SEM design itself, c.f. the way it has been developed, are considered under the Design Risks sections of this report);
- Participant system design and delivery;
- Participant qualification and registration;
- Testing and Market trials;
- Commercial readiness;
- Organisational readiness;
- The Go Live process;
- DS3 interaction; and
- Overall Programme and Project Management.

B.1 Development of the I-SEM Design

Rules Working Group

- Material being presented to the RWG is very immature
- Given the volume of work, there is very little opportunity in the RWG for proper discussion and participant engagement. This has resulted in a strong TSO bias to the T&SC development
- RWG escalation route is not clear; (uncertainty of RWG process * uncertainty of T&SC content) = significant risk to participant understanding of T&SC and thus subsequent systems, commercial and organisational design activities
- Significant volume of unresolved issues very late in the RWG programme
- Participant feedback is ignored and / or issues are closed whilst at odds with feedback, with inadequate explanation
- Uncertainty over the authorship and availability of the agreed procedures
- The CMC has short-circuited the RWG process. This is unacceptable as it doesn't allow for proper scrutiny of the document

Consultations

- Hit a wall on the volume of consultations and other design documentation, and have no extra people to devote to this task
- We are a very small organisation, without the resources fully to review all design documentation. We would appreciate a programme of briefing activities for smaller participants to help us get up to speed
- Even though we are one of the larger participants, we are still facing significant consultation overload. This is preventing us doing effective due diligence on the proposed I-SEM design and operation
- It is not at all clear to us how the timing of the various document publications links together – for example licences prior to the T&SC, CMC and BCOP; CMC prior to the publication of decisions of some of its constituent material
- Proposed four week consultation on the CMC is completely inadequate given its complexity and importance. Also running in parallel with the T&SC consultation

- The consultation on the locational element of the CRM is an 11th hour change and is significantly undermining confidence in the overall CRM model and its delivery. In addition, a four week period is inadequate for such an important consultation

NEMO Rules

- There is little or no transparency over the NEMO arrangements. The BLG is not a suitable forum for the development of NEMO rules

Grid Code

- An independent review of the Grid Code is required, with subsequent modifications to ensure it aligns with the new market arrangements under I-SEM

IDM Design

- There is no finalised design for the interim IDM solution, and therefore no understanding of how to mitigate imbalance exposure
- There has been no RA consultation on the interim IDM solution, despite the criticality of this market to the integrity of the overall design

B.2 Participant system design and delivery

- (We are) radically descoping our proposed design for participant systems in order to deliver on time, but at the cost of significant commercial and operational risk
- Can start procurement PQQ activities now, but need legal draft of T&SC as a basis for systems procurement contract, and are also subject to Utilities Procurement Directive which adds time into the process (e.g. for standstill)
- Finalised T&SC is needed to start system design, but is not essential for procurement to proceed
- The majority of participants are likely to select a system (ABB NMarket) which although in use in the US for eight years, has never been implemented in Europe, still needs development for that market, and for which there is an extremely availability of experienced system implementation resources.
- We estimate system delivery activities are only about 30% of the total work required for I-SEM Programme Delivery
- If, as reported, the TSOs' delays with the BM system spec are due to their vendors taking time to understand the complexity of the proposed design, what hope is there for participants' implementations?
- It is proving extremely difficult for us to get investment funding for I-SEM from our owners in the face of a highly unstable design baseline

B.3 Participant qualification and registration

- We are being asked to sign up to licences which reference documents which are not yet published. The whole sequence of document development and subsequent accession is out of order
- Late development of NEMO rules means there is currently no end to end view of the credit and collateral / working capital arrangements, which may be extensive given the exclusive nature of each market
- There is no clarity on the levels of credit cover and collateral needed, let alone how to put it in place. This may be a particular burden for smaller participants who have not had great experience of this before. More generally, these types of third party interactions are not included in the programme plan but are critical to Go Live
- Has the time to register credit requirements between participants and each market been allowed for – this is much more complex than the current environment
- Need help with / information on the registration processes – a 'how to' guide
- The TSOs already have all the registration data for SEM - why can't it be reused?

- We have had preliminary discussions with two Irish banks to act as a clearing house for our NEMO transactions. In both cases, knowledge levels were extremely low, and the NEMO needs to expedite this
- SEMO has indicated it needs 9 to 10 months to put in place banking arrangements. No proper consideration has been given to the time required by participants to put in place adequate financing arrangements for I-SEM
- Lack of clarity on NEMO arrangements for credit and collateral, settlement and banking requirements on participants
- Qualification for EPEX should start as early as possible to allow for inevitable delays in the process
- We have considerable experience of the EPEX need for clearing banks in other [non-Irish] markets. Our international base means we have both wider knowledge and influence, but even we are experiencing reluctance in the Irish market to provide these services – especially at reasonable margins and levels of collateral. Our experience in the UK market suggests at least a year is needed to establish clearing bank facilities from scratch and then get participants through the KYC / credit committee processes

B.4 Testing and Market Trials

- Our own test programme is very complex, given all the new interfaces to existing systems
- The planned overlap in the I-SEM Test programme is not sustainable
- I-SEM Market Trials are overlapping our own system testing programme, and the programme allows no time for commercial testing
- Four month period for Market Trials is very tight, especially if participants are not ready to enter at the start of it
- Clearly defined criteria are required for entry into Market Trials
- Participants should be assured that Market Trial will only be entered when the TSOs' systems can be publically demonstrated to be fully tested and stable. We do not want valuable Market Trial time to be eroded by having to fix bugs in the core systems
- In the event Market Trials reveal significant bugs in the core system (which haven't been fixed in earlier test phases) the Trails should be paused and re-run once these have been addressed
- The Market Trial strategy should be consulted on to ensure it is designed to give participants what they want from this critical activity
- Participants should be able to review the proposed Market Trial scripts in advance, to ensure they test the full range of market processes
- Need a full traceability matrix to show how the proposed test scripts map back to the High Level Design and the T&SC, and thus the coverage of that which will be achieved
- Market Trial will only test systems readiness – is not a true commercial trial, and is unlikely to resolve uncertainty on how the market will operate. Would like as much fully commercially realistic unscripted testing within the Market Trial as possible to alleviate this. However, recognise difficulties in getting GB to participate, and also to including shadow Euphemia operation. Also no guarantees on how other participants will behave in a trial environment, but you can still learn from rogue behaviour
- We believe the Market Trial will test each of the four markets [Forwards, ID, DA and BM] independently. It should be possible to test these running in parallel in the same test environment
- As a small participant we are not sure that the I-SEM design has properly taken into account our particular circumstances (the rules of engagement have been designed but have not taken account of local circumstances). This may only come fully to light during Market Trials which is very late in the day for either us or the TSOs to respond

B.5 Commercial Readiness

- Complexity of I-SEM design makes it very difficult to prepare a commercial strategy in anticipation of Go Live

- Need the T&SC, CMC and all parameters in order to develop our trading model, on which to base our commercial strategy
- The extremely late notification of parameter settings ahead of market trials and capacity auctions is a significant issue for us. We will need to do significant modelling and assessment once these become available
- Would prefer a much longer period after the CRM auction, plus a longer period after the rules are agreed to put CFDs down and lower likelihood of price shock
- We have a large number of existing supply contracts with customers, all of which will have to be opened, checked and modified as needed to reflect the introduction of I-SEM. This process can't start until the T&SC and CMC are agreed, so will thus need to be completed by a very small team within an already very busy six month window
- We will need to reopen all our PPAs and contracts to ensure they align with the I-SEM arrangements. We cannot do this until we have the finalised T&SC, confirmation of BM operations and REFIT; this leaves very little time indeed to complete this work before the proposed I-SEM Go Live
- The programme is focusing on functional readiness of the TSOs, with very little regard for commercial readiness of the participants

B.6 Organisational Readiness

- We have significant work to do in terms of organisational readiness. We need to review shift patterns and T&Cs for existing employees, to recruit new staff, and to deliver a comprehensive training programme
- We expect to have to move to 24/7 trading. This is a very significant organisational change for us, with little time in which to accomplish it
- The very short time period between completion of the CMC and entry into market testing makes it difficult to train staff sufficiently on commercial readiness

B.7 The Go Live Process

- The overall Go Live Approach needs to be developed and published asap
- Pre-defined criteria are needed for Go / No Go decisions, including their agreement with industry
- A decision to go live should be supported by a robust reassessment of the original CBA against the delivered solution

B.8 DS3 Interaction

- The DS3 programme is a disappointment. We have been advising our shareholders on this, but have less and less to say with any degree of certainty. The proposed sums of money available through it have gone down and down, and the mechanisms to obtain these not delivered
- There is no clarity on the interrelationship between I-SEM and DS3 – neither in the design nor the delivery timescales
- Lack of clarity on DS3 arrangements which will be in place at the time of I-SEM Go Live is impeding the development of our commercial strategy

B.9 Overall Programme and Project Management

- We would like I-SEM programme delivery to continue at pace (but not at unacceptable levels of risk) as we welcome the new market model
- I-SEM Programme is being driven by a questionable administrative deadline which is setting unrealistic project timelines, undermining the quality of the solution, and therefore challenging its practical and commercial viability
- There is a trade off of time, cost and quality going on at present. Time is winning at the expense of cost and quality

- From a participant perspective, there is absolutely no scope for further slippage in the programme timelines if the Oct 17 Go Live date is to be met
- All timescales are approximately 50% shorter than the SEM equivalent for a programme which is at least twice as complex.
- General shortage of resources. Having to bring in from the UK or further afield, which is expensive.
- Would like a clear and timely decision from the SEMC either to stick with proposed Go Live date, or any recalibration.
- We have no realistic contingency plan, except to throw money at the problem
- The complexity both of the proposed I-SEM design, and our ownership structure, means we spend a very long time trying to explain one to the other in order to keep our management team up to speed
- We do not have the transparency we would like over the TSOs' delivery plans. The reporting approach based on [shared] Level 2 milestones means that they are not required to report progress on their own internal activities. As a result we do not have any evidence to show they are able to absorb the reported slippage, nor the level to which it impacts on other milestones. We would like them to publish more detail on their lower level plans – more transparency will help to build more confidence in programme delivery
- Level 2 milestones change from green to red in the progress reports over a matter of days without going via Amber. This casts serious doubts over the efficacy of PM controls over the programme
- The plan is very RA and TSO centric. It is extremely difficult to work through the milestones in order to determine what a participant has to do to deliver his own programme
- Delivery of the interim XBID solution is not in the programme plan
- Proposed timelines for the implementation of F&L policy are unrealistic – we doubt a centrally cleared forward market can be created by May 2017
- The PMG is a lecture. Participants are not listened to, nor is there any follow up action. The TSOs are not listening to participant nor getting their buy in
- There needs to be more communication between the various TSO-led participant liaison groups. It is not clear what matters fall within the remit of each group, and we see issues being batted around between them
- The TSO participant engagement is very mechanistic and anonymous. The RAs have bilaterals with the larger participants on issues they want to test out. However, these are not extended to smaller participants. The RAs should be running some form of 'customer account' programme to provide a channel (either regular or as needed) for communication with all participants on a 121 basis
- We see no evidence that the programme's external dependencies are properly identified and being managed, for example the input which is required from the various GB bodies for approvals, from PCR for DAM pricing, ECC for DAM trading and the NI / Irish departments for State Aid
- The programme is dependent on State Aid clearance, but we see neither plans for, nor progress on this
- Ongoing independent expert QA is need both of the programme management arrangements, and the I-SEM design. This includes a rigorous assessment of TSO readiness and a validation of the accuracy of their external reporting
- A detailed review and report on potential BREXIT implications for I-SEM is needed, including operational and legislative impact, potential for tariffs on electricity trade under the WTO¹⁶ rules, reliance on REMIT and implementation of appropriate safeguards and contingency measures
- We request that the SEMC reaches its conclusions on the Stocktake quickly in order to avoid significant further uncertainty in the delivery programme. The outcome of the Stocktake must also be fully transparent, including publication of the Stocktake report.

¹⁶ World Trade Organisation

Appendix C Summary of Participant Key Points on Design Risks

The following tables summarises a number of key points that were raised by participants with the ESP Consultants as part of the stock-take participant interviews, and which have not been considered in the main document. These points are being progressed by the Regulatory Authorities' Design Authority.

Name	Description	Status at time of writing
Euphemia Impact	Euphemia is the scheduler used to optimise market coupling at the day ahead stage. For the I-SEM, this will additionally schedule all I-SEM generators at the day-ahead stage leading to the day-ahead price. This schedule is likely to be different to that for the I-SEM introducing some uncertainty for participants.	This uncertainty is normal at the changeover to new market arrangements
Euphemia sub-optimal	Some participants mention cases where (during the Euphemia trial), Euphemia delivered schedules that were clearly sub-optimal based on knowledge of the data they had provided	We find this surprising, given Euphemia's usage in other markets – but plan to review any specific cases
Day Ahead Transparency	Participants wish all data they submit to the Day-Ahead NEMO to be published; however, they believe the NEMO will block this	The data concerned belongs to the participants. If they agree to its publication, this should not be blocked. The ETA team are going to explore further
EDIL for Wind	It was questioned whether 'Wind' plant will have to be actively despatched by the System Operator – and hence whether they require computer systems to capture and respond to electronic despatch instructions issued by the TSOs	
Priority Despatch Compliance	It was questioned whether the arrangements will meet the requirements for Priority Despatch under the Energy Efficiency Directive	It is planned that this will be covered through the Balancing Market Principles statement and then implemented through changes to the Grid Code
GTMA Equivalent	The 'Grid Trading Master Agreement' is the template contract used for the bulk of electricity traded in GB in forward timescales. A number of participants asked for the RAs to take a leading role in facilitating the establishment of an equivalent for the I-SEM	This is being considered as part of work on Forwards and Liquidity
Flagging and Tagging	Concern was expressed that the TSOs will have too much discretion in choosing which	Balancing Market Principles will constrain the TSOs discretion

	balancing market instructions are 'flagged or tagged' as being for non-energy actions	
Intraday Liquidity	A number of participants are concerned that intra-day liquidity will be low – mirroring that observed in GB.	Where markets of this type have been implemented elsewhere (e.g. Italy) there has typically been sufficient liquidity.

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Appendix D Experience from other markets

This appendix summarises some experience of implementing market changes similar to those envisaged for the introduction of the I-SEM. The key changes covered below are:

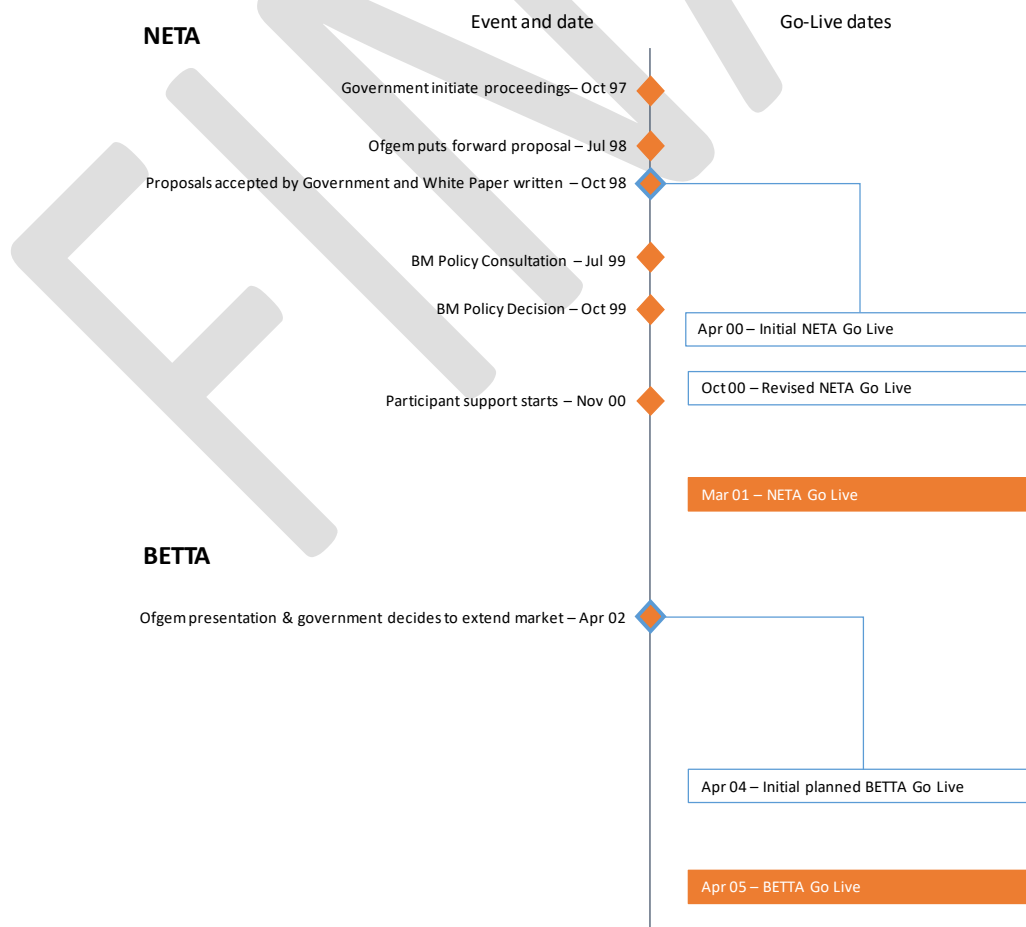
- The introduction of NETA:** NETA introduced changes to the England and Wales electricity market similar to those envisaged to the energy markets of Ireland and Northern Ireland under the I-SEM. The entire process took 3½ years, one year longer than planned, with the go live date being delayed twice. One such delay occurred at six weeks' notice – resulting from issues identified in testing central systems. This significantly impacted energy contracting at the time.

The introduction of the I-SEM has a larger scope than the introduction of NETA. Specifically, the I-SEM additionally includes a Capacity Remuneration Mechanism.

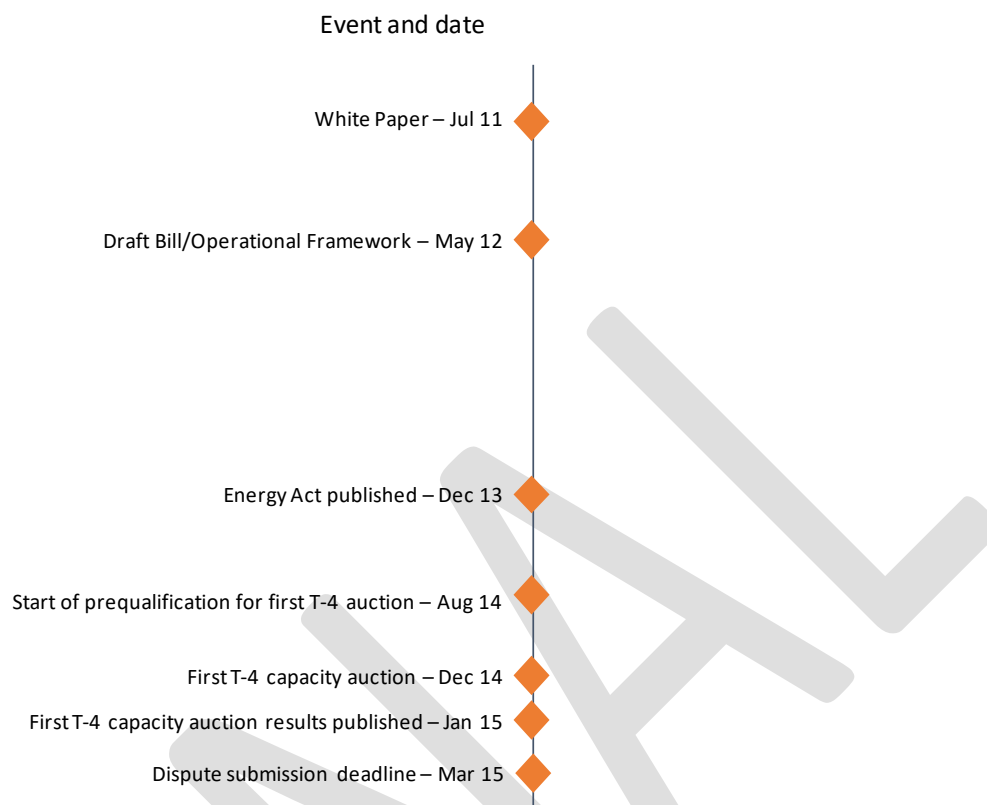
- The introduction of BETTA:** BETTA was the extension of the NETA arrangements to include Scotland – becoming the 'British Electricity Trading and Transmission Arrangements'. This took three years from the initial decision, one year longer than planned.
- Electricity Market Reform:** Electricity Market Reform added a Capacity Remuneration Mechanism to the existing BETTA market, as well as introducing new ways to contract low-carbon generation. These two initiatives were pursued in parallel. The entire process took over four years with a team of over 20 civil servants plus additional support from consultants and lawyers.

The diagrams below show the timelines for both the progression from the pool towards BETTA, and the relevant events along the EMR timeline.

NETA/BETTA Timeline



EMR Timeline



In the case of NETA, Go Live was twice delayed from the initial plan. Additionally, it is worth noting that even six weeks before the revised Go Live date of October 2000, no further delay had been planned; in mid-September 2000 it was recognised that problems during testing of central IT platforms meant that a delay should be implemented and a replanning exercise took place. This completed in October 2000, the month of the revised Go Live date, and led to a five month delay to Go Live, which was eventually achieved.

In the case of BETTA the April 2004 date was first proposed in 2002. It was later realised within the firming project that a more achievable date would be April 2005, and no delays were experienced after the point it had completed its passage through the parliamentary chambers in Spring 2004.

The introduction of a capacity mechanism as part of the EMR programme was first mentioned in a July 2011 White Paper, which detailed a timeline for all activities. This set a December 2014 date for the capacity mechanism to be in place, as was indeed achieved. However, this should be seen in the context of the contemporary GB energy market, which was well established and not going through change during the three years of 2011-2014; while new mechanisms were being introduced, energy trading arrangements were largely unaltered.

This sequence of changes in the GB market shows that it is not unusual for delays to be encountered in such large scale change programmes, and in the GB case the level of delay seems to have tallied with the level of disruption to fundamental energy trading arrangements. This should not be surprising – testing and trialling systems needs to result in industry participants having confidence that they are able to access prices required for them to meet their costs. This was the reason behind the delay for NETA and BETTA, whereas in the case of EMR the basic energy trading arrangements were not being changed. It therefore seems prudent that any large change programme that includes an implementation of new energy trading arrangements requires additional time in the test and trial phase to give participants comfort.