



Balancing Market and Capacity Market Options

Consultation Paper SEM-19-024

A Submission by EirGrid plc. & SONI Ltd.

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1 EXECUTIVE SUMMARY

EirGrid plc and SONI Ltd welcome the publication of the Balancing Market and Capacity Market Options Consultation Paper and the opportunity to respond to the consultation. As this is an all-island matter, EirGrid and SONI felt it appropriate to jointly respond and refer to both companies using the collective term 'we' throughout this response.

With respect to the proposals on the removal of Difference Charges where operational constraints are binding, we believe this is an appropriate means of mitigating the SEM Committee's concerns of the financial impacts of high Imbalance Settlement Prices.

We, however, believe that the proposed change to move to a Simple NIV Tagging approach in Imbalance Pricing should not be made. While there is merit in considering changes to the pricing mechanism in order to ensure the price signals provide the appropriate incentives to the market, we consider that the complete removal of flagging would remove important information from the Imbalance Settlement Price calculation.

Changes of this scale need careful identification and definition of the problem to be solved, and sufficient analysis of the impacts of that change, across the range of options available. We believe further work and analysis in addition to that which was presented in the consultation paper would need to be undertaken to justify any significant change to the pricing approach. EirGrid and SONI would be keen to assist the SEM Committee in carrying out further analysis and identifying potential alternative solutions if required.

We believe in addition to the analysis completed to support this consultation account should be taken of other important price signals rather than focussing solely on the relationship between the Imbalance Settlement Price and the Net Imbalance Volume. We have provided some analysis to show examples of correlations between other metrics and the Imbalance Settlement Price. Once these relationships are taken into account, many of the pricing outcomes discussed in the consultation paper become more intuitive.

There are also different ways of presenting the results which change the observations and conclusions made. We have provided examples of this additional analysis in our response. We also believe that further analysis needs to consider a sufficiently long study period, taking into account the impact of changes to date (such as Mod_09_19 on Removal of Locational Constraints from Imbalance Pricing Calculation), and a larger study sample with the impact of defects diminished as much as possible.

There are other options for potential improvements to the pricing mechanism which have not been considered in the consultation paper. These other options have the potential to address the root causes of the undesired outcomes that the SEM Committee is concerned about, without the unintended effect of dampening the price signal that would arise from changing to a Simple NIV Tagging approach.

EirGrid and SONI remain committed to supporting and engaging with the SEM Committee and Participants to analyse and develop potential changes to the wholesale market arrangements to ensure the signals provided are the most appropriate to incentivise the best responses and outcomes for the market.

2 INTRODUCTION

2.1 EIRGRID PLC AND SONI LTD

EirGrid plc is the licenced electricity Transmission System Operator (TSO) in Ireland, and SONI Ltd is the licensed TSO in Northern Ireland. Both companies also hold Market Operator licences in Ireland and Northern Ireland respectively and collectively act as the Single Electricity Market Operator (SEMO), which operates the Single Electricity Market (SEM) on the island of Ireland.

As part of its role EirGrid has developed and is operating a High Voltage Direct Current (HVDC) electricity interconnector with 500 MW transmission capacity linking the British and Irish Electricity markets. This is known as the East West Interconnector (EWIC). EirGrid Interconnector DAC is the licensed operator of EWIC and is a 100% wholly owned subsidiary company of EirGrid plc.

EirGrid and SONI welcome the opportunity to comment on the Regulatory Authorities' Consultation Paper on the options for balancing market pricing mechanism and difference charge mechanism considering flagging outcomes in pricing. This response is submitted by EirGrid and SONI in their capacities as TSOs and MOs for Ireland and Northern Ireland.

2.2 STRUCTURE OF OUR RESPONSE

This main part of this response is made up the following sections –

- **High Level Views and General Comments** – this sets out some of the thinking from EirGrid and SONI with respect to the consultation paper and the proposed changes;
- **Views on Price Signals** – this discusses some of the signals it is important for the Imbalance Settlement Price to provide, what these signals should incentivise, comments on the analysis provided in the consultation paper, and provides additional analysis in order to support these points;
- **Definition of Marginal Unit and Non-Energy Actions** – these sections comment on the interpretation of the market design required for the current and proposed pricing mechanisms;
- **Impact of Change on Dispatch Balancing Costs** – this provides comments on the potential impacts to Dispatch Balancing Costs which the proposed change could result in from a qualitative perspective;
- **Answers to Consultation Questions** – this intends to provide a direct answer to the questions asked in the consultation, referring to the remainder of the document for the information used to support those answers;
- **Removal of Difference Charges where Operational Constraints are Binding** – this provides our views of the other option considered on adjusting settlement outcomes arising from certain pricing outcomes.

3 SIMPLE NIV TAGGING

3.1 HIGH LEVEL VIEWS AND GENERAL COMMENTS

Throughout the rules and system development phase of the I-SEM project - including the development of early design documents, Rules Working Group presentations, and responses to Participant queries - the requirements of the high level and detailed design were constantly to the fore. The characteristics upon which the calculation of the Imbalance Price (PIMB) was developed were as follows:

- Efficient:
 - o Marginal energy action taken to meet the Net Imbalance Volume (NIV);
 - o Based on actual dispatch / actions taken;
 - o Mitigates Imbalance Price pollution by non-energy actions;
 - o Mitigates spurious outcomes and/or excessive volatility; and
 - o Can produce prices within one hour of real time.
- Robust & Adaptable:
 - o Builds on GB experience;
 - o Adapted for non-energy requirements of I-SEM;
 - o Not susceptible to over-tagging; and
 - o Capable of operating under changing market dynamics.
- Objective & Transparent:
 - o Clearly documented process published;
 - o Automated to the greatest extent practical; and
 - o Not be overly influenced by any TSO subjectivity.

In the Energy Trading Arrangements Detailed Design decision (SEM-15-065), where it was decided to implement the Flagging and Tagging approach, it was claimed on page 114 that: “the Flagging and Tagging approach is more strongly aligned with the intention of the HLD as it explicitly identifies the nature of each action taken, and the marginal energy action taken to meet the NIV”.

Both the High Level Design and Detailed Design highlight that the incentive to be balance responsible is a key signal to be provided by the Imbalance Settlement Price, and therefore the relationship between the NIV and the Imbalance Settlement Price is an obviously important one. However the Detailed Design highlighted that the balancing market in general, and the pricing mechanism in particular, should take into account other signals, such as incentivising flexibility in provision of balancing services.

For example the Detailed Design mentions:

- that the I-SEM will have more incentives for “more flexible plants to enter the market and for existing plants to reduce their [notice] times”;
- that a framework for non-energy actions will be developed in part to “investigate ways in which improved signals can be delivered to plant to become more flexible”;
- in comments against the Simple Stack imbalance pricing option: “The Committee agrees with comments that, by ignoring plant dynamics, the approach is too simplistic to provide a realistic basis for a reasonable market design and that as a

result, it is likely that prices would be overly dampened and flexibility may not be adequately rewarded.”;

- in comments in favour of the Unconstrained Unit from Actual Dispatch option: “The SEM Committee acknowledges the comments in support of Unconstrained Unit from Actual Dispatch that a strong imbalance price with cost reflective price signals will be important to promoting greater participation and encourage investment in flexible generation and demand response. The SEM Committee agrees with these comments.”
- “The SEM Committee recognises the need for the imbalance price to both produce a signal for parties to trade balance ex-ante and to provide appropriate price signals to flexible plant within balancing market timeframes. The approach to marginal imbalance pricing must therefore balance the ability to forecast prices with efficient incentives.”

Therefore, we believe price signals which help incentivise flexibility should not be ignored, or unduly weakened, in order to move to an approach which intends to enhance the incentive to be balanced through enhancing the relationship between the Imbalance Settlement Price and the NIV.

We are uncertain about the problems which have been identified as requiring resolution. It appears from the commentary in the consultation paper that the desired outcomes are to create a less volatile Imbalance Settlement Price and a price signal which is more closely tied to the value of the NIV, with close ties to certain price spreads against day-ahead market prices in certain circumstances. There is also a large focus on a small number of individual days and Imbalance Settlement Periods and whether or not the signals were as anticipated in those isolated instances. This seems to have driven the investigation into changing to a specific pricing mechanism which is known to deliver those intended outcomes. With the consultation paper analysis claiming that Simple NIV Tagging is less volatile and has a stronger relationship between NIV and Imbalance Settlement Price, it concludes that it is preferable based on the fundamentals.

However, this conclusion appears to have been made without reflecting on the cause of the volatility in the current pricing mechanism, what level of volatility would be deemed appropriate or what the expected correlation of the Imbalance Settlement Price to the NIV would be for the market based on the fundamentals. There may be aspects of the current Imbalance Pricing mechanism which do cause undue volatility and unanticipated price signals, and there may be means by which improvements can be made to achieve a more correct level of volatility and price signal. However, these don't seem to be considered, instead only investigating if a wholesale change in pricing approach would result in reductions in volatility and increasing certain price signal characteristics. Simple NIV Tagging may be a preferable option from the point of view of creating a pricing approach which is less complex and easier to understand. However, from the consultation paper this does not seem to be the problem being resolved, which is more related to price signals based on fundamentals.

The characteristics of the Simple NIV Tagging approach could only ever mean it would have a stronger relationship between the Imbalance Settlement Price and NIV due to that being the

primary (potentially sole) signal being incentivised in the mechanism. Given this characteristic, determining that it is a mechanism which better reflects the fundamentals of the system because it has a strong relationship with the NIV may not be valid. This approach does not ask whether or not the strong relationship between the Imbalance Settlement Price and NIV provides a good or correct signal in itself. This would result in other important signals being lost by prioritizing the NIV signal. It is also characterised by a relatively less volatile Imbalance Settlement Price so long as the volumes and prices of actions taken do not change much between subsequent periods. However this may not be an accurate reflection of the volatility driven by elements, such as changing balancing needs over time, different elements of a highly constrained system becoming binding over time, and different units therefore becoming available over time to meet the balancing needs.

There appears to be heightened importance placed on the relationship between the NIV and Imbalance Settlement Price, and the correlation of NIV and the spread between this Imbalance Settlement Price and the day-ahead market price. There are other important signals in the Imbalance Settlement Price related to metrics other than the NIV which are of particular importance in the SEM. This includes the relationship to the level of constraints on the system, the level of curtailment of renewables, and the flexibility of plant available to provide balancing energy, which would be lost by changing the mechanism. These relationships provide important signals for incentivising longer term investment in additional flexibility on the system, particularly when the system is moving towards a far higher penetration of variable renewables.

If these signals are responded to, this should reduce the correlation between the Imbalance Settlement Price and these metrics. For example if additional flexibility is developed and constraints and curtailment on the system are reduced, the signals which incentivised this to happen should begin to reduce, this should leave the signals from the relationship between the Imbalance Settlement Price and the NIV to strengthen the shorter term incentive to be more balanced.

Removing the higher priced actions from setting the Imbalance Settlement Price could mean diminishing the I-SEM detailed design intent of incorporating the fixed costs of energy balancing actions into the Imbalance Settlement Price. This is because these startup energy balancing actions would typically be the most expensive priced action each time they arise, and therefore likely to be tagged out. This could be strictly justifiable by the logic that the Simple NIV Tagging approach is defining those higher priced actions as non-energy by virtue of them being expensive. However, it could lead to unintended consequences where not only would intuitive energy balancing actions be excluded from setting the Imbalance Settlement Price, but the additional costs of starting up a unit to provide energy balancing becomes far less likely to be incorporated into the Imbalance Settlement Price.

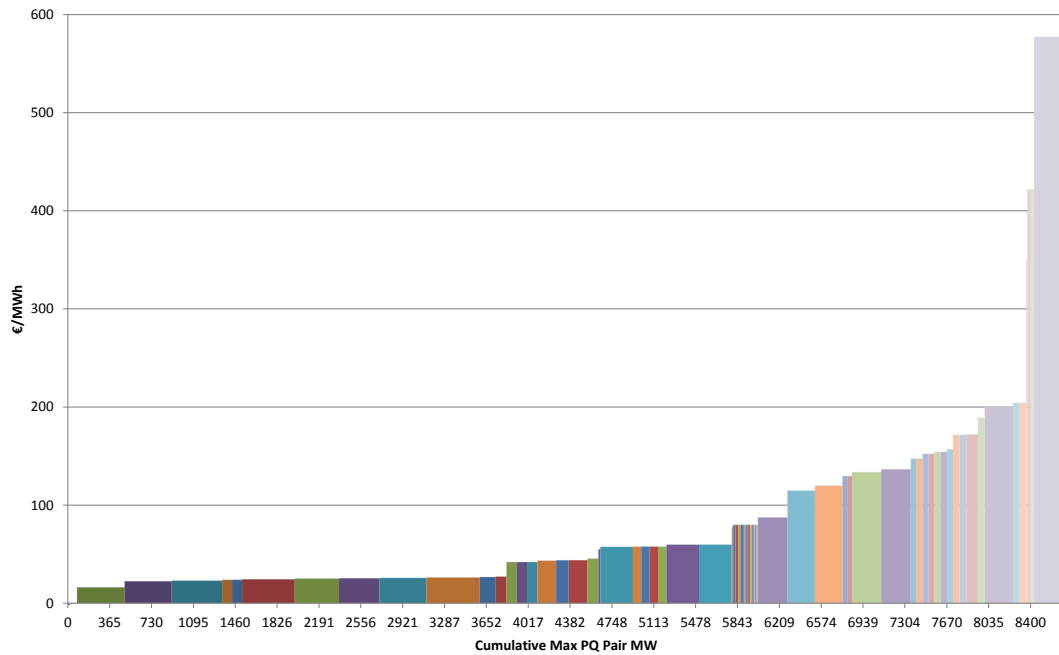
The undesired volatility may be driven by aspects which are not due to the pricing mechanism itself as a whole, but rather aspects which can be individually managed. Examples include aspects where a focussed change has already been implemented or is currently being considered, such as where a different approach to locational constraints was implemented in flagging under MOD_09_19, and where a different approach for negative prices for priority dispatch is proposed under MOD_10_19. However one which has a

potentially high impact on the price outcomes which seems to not have been considered so far is the high stratification of Simple Commercial Offer Data (COD) prices.

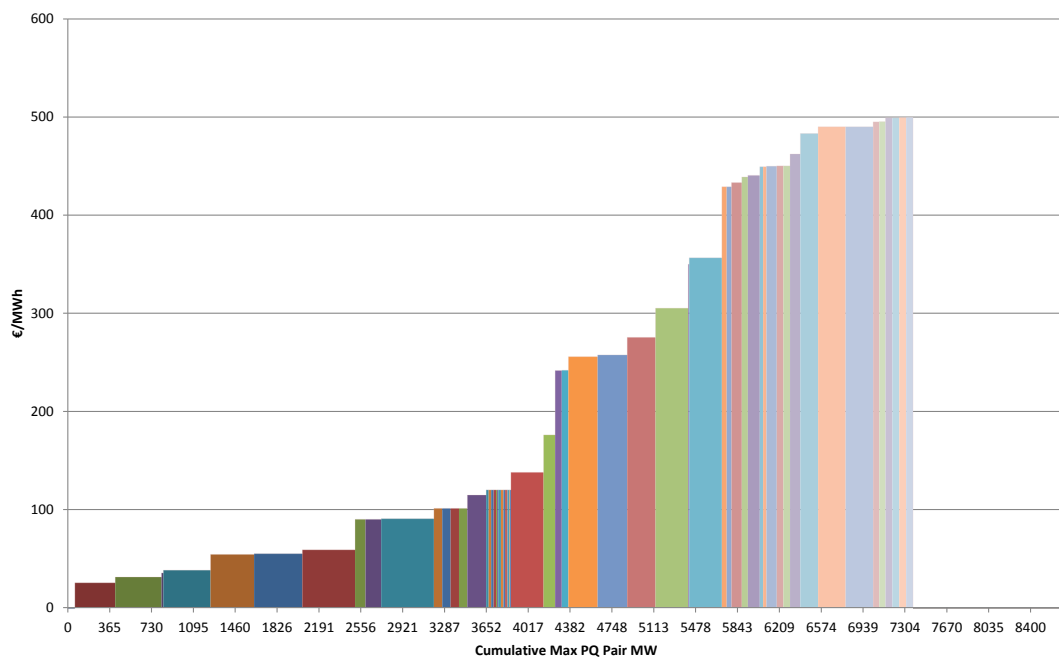
Imbalance Settlement Prices going to the level discussed in the consultation paper is not just a function of the price setting approach, but also of the prices being submitted by Participants. Some of the reasons for the size and visibility of the volatility may be due to a much steeper merit order price quantity curve for Simple COD than Complex COD, rather than the pricing mechanism itself. In the new market arrangements, the merit order price curve of the COD which is used to set the Imbalance Settlement Price the majority of the time, Simple COD, has a much steeper gradient between increases in prices with volumes in the merit order.

The following graph gives an example of this steeper variation between prices in a merit order based on Simple COD compared to Complex COD. The quantity weighted average price for each unit is calculated based on their price quantity pairs, which is charted on the Y axis, while on the X axis the maximum MW from the price quantity pairs submitted by the unit is charted. This shows approximately the price at which each MW in the merit order for a period is available. This unit-based average approach was taken to reduce the sample size from every single price quantity pair, however it is still representative of the relative differences in prices for the quantities over which those prices are available. Also note that only conventional generator units who submit the relevant COD at non-zero values have been included: DSUs have not been included, and the units who submit prices of zero have also not been included. The period chosen was 26/06/2019 11pm.

Unit Weighted Average Price Merit Order Complex COD 27/06/2019



Unit Weighted Average Price Merit Order Simple COD 27/06/2019



What these graphs indicate is that the merit order of these kinds of units has a much more smooth, gradual and small variation between price levels moving up along the available MW when considering Complex COD than when considering Simple COD. Since Simple COD is the primary price input used in setting the Imbalance Settlement Price, this has a direct impact on the level of variation and volatility in the Imbalance Settlement Price. On the Complex COD merit order, a relatively large change in MW would result in a much smaller change in

price used, in particular around the middle of the merit order, than the change in price used which would result from a relatively small change in MW on the Simple COD merit order.

Therefore for relatively small changes in imbalance volumes requiring balancing actions, there can be a relatively large variation in the Imbalance Settlement Price resulting from using Simple COD than would be expected from the understanding of merit order price quantity curves from the previous market arrangements, and potentially from what would be present in the ex-ante markets. The general trend is much steeper, and the jumps between many individual prices are also much larger, when considering Simple COD than Complex COD. This would mean greater volatility in Imbalance Settlement Price changes is somewhat inevitable based on the inputs alone, not just the pricing mechanism in place.

Given that MOD_09_19 was approved and implemented for the beginning of May 2019, there has not been enough time to properly assess its impact. It would be prudent to allow time for the accumulation of data to see if it has had the desired effect, or whether it addresses the concerns in the consultation paper. In particular it would not be possible with such a small sample size to assess whether the responses to the new signal are improved, as these responses may take a number of weeks or months of trading experience to develop and have obvious trends arise. Even with the sample size considered of go-live to the end of February, this is potentially too little time over which to fully identify trends and converging behaviour.

Given such a large scale and enduring change of the pricing mechanism is being proposed, it would be appropriate to consider a wide range of options potentially available for this change. While it is claimed in the analysis that Simple NIV Tagging creates better outcomes than the counterfactual, this does not indicate that it provides the best outcomes versus other potential options which have been or could be implemented. If the other options available are investigated then the root causes of the volatility within flagging can be analysed.

If further options were considered, it could be shown whether a particular aspect of the pricing mechanism is the main driver of the unintended outcomes. With this knowledge, a change in the mechanism could be proposed which targets the cause while still basing the Imbalance Settlement Price on the fundamentals of the other price signals it is important to maintain. This could potentially highlight a better option than both the change and counterfactual cases considered in the consultation paper.

Therefore if after reviewing the impact of the implemented and proposed modifications over time it is felt more actions are required, EirGrid and SONI would be happy to discuss with the SEM Committee and Participants potential further options which could be analysed. Based on the discussion in the consultation paper, and concerns raised by Participants in the past on pricing outcomes, examples of options which could be considered include the following:

- Changing flagging for specific System Operator constraints (similar to MOD_09_19);
- Changing aspects of Non-Marginal Flagging only;
- Changing the inputs to the calculations System Operator Flags for all periods, or only in specific circumstances;

- Changing the approach to System Operator Flagging to incorporate more manual elements;
- Changing the rules about the designation of the Marginal Energy Action Price for certain scenarios.

3.2 VIEWS ON PRICE SIGNALS

Price signals, provided by the relationship between the Imbalance Settlement Price and various metrics which are fundamental to the market and power system, are important to incentivise responses that improve these metrics and by extension improve the market and power system outcomes. These signals can act in different timeframes, for example:

- Short term incentives to improve trading to be more balanced (balance responsibility) and trade economically;
- Medium term incentives to increase flexibility through changing technical characteristics and trading approaches;
- Long term incentives to invest in larger changes to technical characteristics and for new entrants to the market.

The following are among the most important metrics the Imbalance Settlement Price needs to have a relationship with:

- Net Imbalance Volume;
- System demand and capacity margin;
- Variable renewable generation;
- Net demand (level of wind and interconnector ramping impact on the demand to be met through actions on conventional units);
- Extent and type of system operations constraints binding;
- Extent of unit technical (non-marginal) constraints;
- Level of curtailment of variable renewable generation;
- Interactions between multiple metrics and signals at the same time.

One of the primary important outcomes which drive behaviours in the market would also be the relationship between the ex-ante market prices and the Imbalance Settlement Price. The level of the spread between these prices would change depending on which of the signals are present or most strong.

The following sections provide explanations for these signals, their importance, and provide analysis to demonstrate the relationship between these metrics and the Imbalance Settlement Price.

3.2.1 NET IMBALANCE VOLUME

The relationship between the Imbalance Settlement Price and the NIV is an important one as it provides the incentive for Participants to be balanced, one of the primary purposes of the Imbalance Settlement Price. This means different things for different Participant types. For Generator Units, it may mean ensuring that they trade in ex-ante markets, and nominate and operate in the balancing market, to a level which does not create an energy imbalance, and reflecting their real-time availability, reducing the TSOs' to take energy balancing actions

on other units. It also incentivises suppliers to trade in the ex-ante markets as close as possible to the actual consumption of their customers, and incentivises variable renewable generators to trade in the ex-ante markets as close as possible to their actual availability. As this trading improves over time, it should reduce the amount of energy balancing actions the TSOs need to take. This should in turn reduce the cost of operating the system as the amount of closer-to-real-time actions taken decrease, these being typically more expensive than cleared volumes in the ex-ante markets.

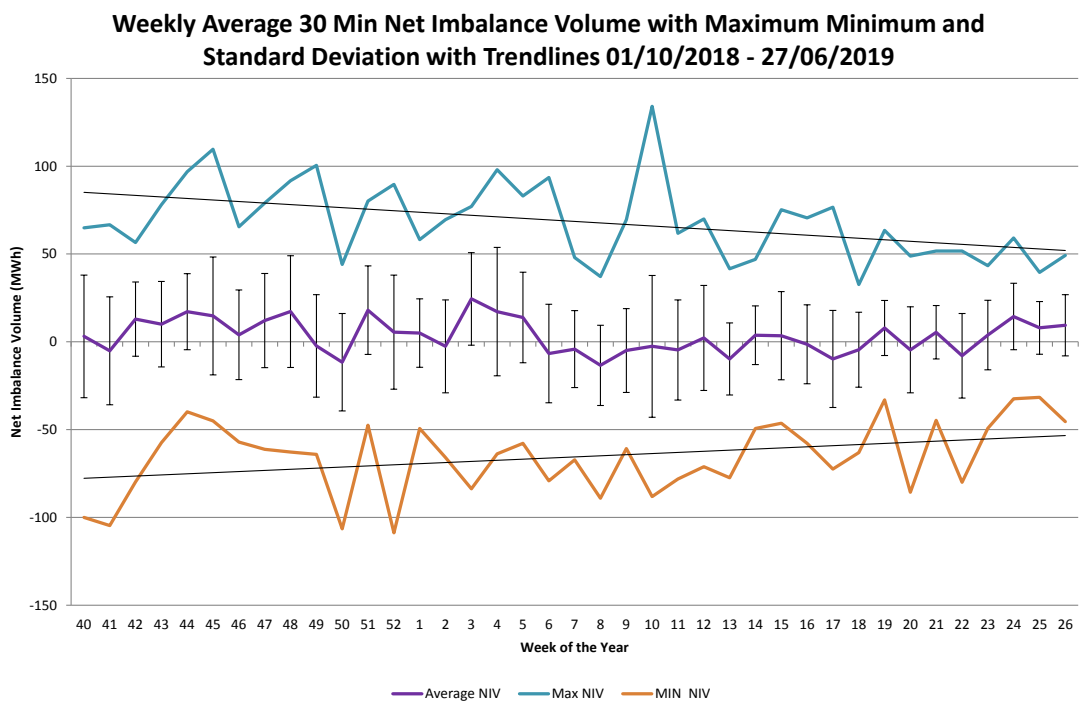
Obviously it would make sense that there should be some relationship between them as the intention is to ensure that units are incentivised to be in balance. As the NIV increases in a positive direction it makes sense that the Imbalance Settlement Price should generally increase to incentivise the units to reduce the volume (those who are short, causing the NIV to increase, would be charged more for providing less power / consuming more power). As the NIV increases in a negative direction it makes sense that the Imbalance Settlement Price should decrease to incentivise the units to again reduce the volume (those who are long, causing the NIV to increase, would be paid less, or have to pay, for providing this additional power / consuming less power). However, this also does not take into account other factors which are beneficial to include in the price signal. For example, the cost of energy balancing over the evening peak demand when margins are lower would be greater, even for the same imbalance volumes or an imbalance volume in the opposite direction, than the cost of energy balancing at lowest demand in the early morning. This is because of the units and start point of the merit order curve used to correct the imbalance are different with different units schedules throughout the day.

Because of this, it is important to consider the relative importance of strength of the relationship between NIV and the Imbalance Settlement Price compared with the relationship between other metrics and the Imbalance Settlement Price, and whether it is considered from first principles a benefit to increase the strength in that relationship by losing the strength in the other relationships. This would mean removing the relationship between the extent of the constrained nature of the system, either from system non-energy point of view or from unit non-marginal and flexibility point of view, and the Imbalance Settlement Price. This could result in a situation where a small NIV would most likely result in a relatively benign Imbalance Settlement Price, even if there are other aspects of the system such as a lack of flexibility driving expensive energy balancing actions to be taken.

The analysis in the consultation paper is looking over all time since go-live, but this granularity does not take into account whether there have been learnings and responses to these signals. It takes all data from go-live and assumes it all has the same basis in terms of the relationship between the NIV, day-ahead market price and Imbalance Settlement Price. This doesn't account for responses to these signals, where metrics in more recent months may show a trend of improvements without the need for changing the market design, or where the changes in the rules have already been made and the results in periods thereafter could more closely resemble what was intended without the need for further changes. It also doesn't account for specific differences in the costs and prices which are generally present in those times, such as the inclusion of Gas Transportation Costs in submitted prices for certain months (typically around October time) and not in other months (typically around February time).

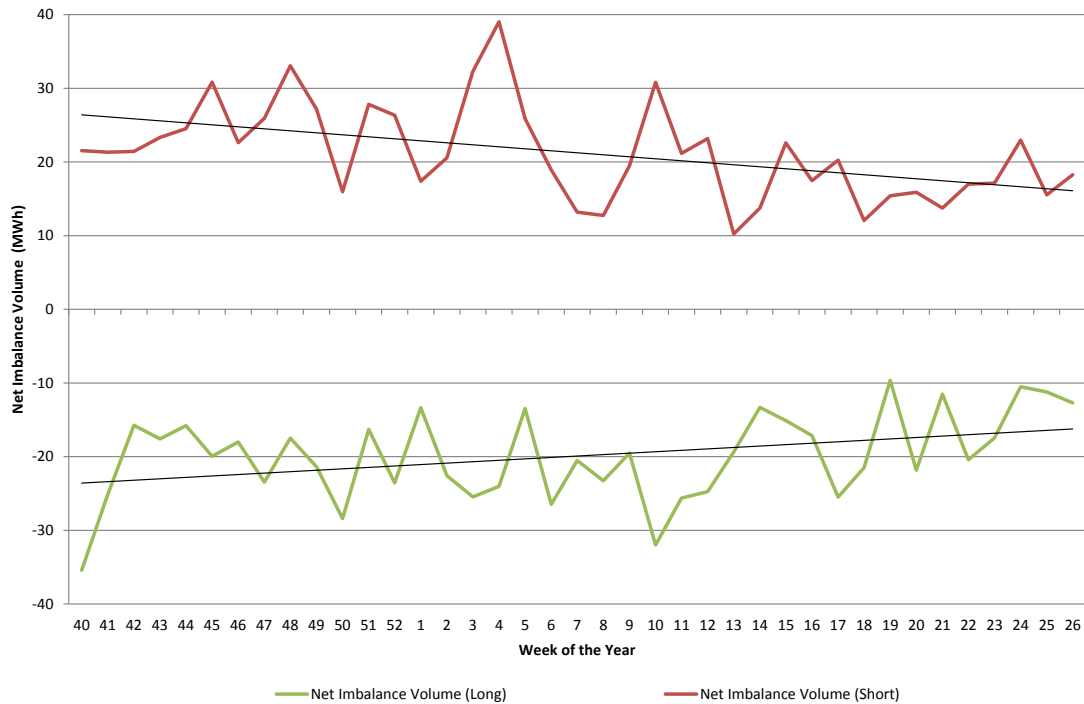
The analysis in the consultation paper primarily relates the NIV to the price outcomes, but the NIV itself is an indicator of how price signals are working in the market. The following graphs of the statistics related to the NIV are split into system long and system short and by week since go-live, to indicate of the extent to which the market is in balance over time. Note that for these graphs the impact of the 24th of January has been removed as the outlier expands the Y axis of the graph to the point where it is difficult to determine any meaningful trends.

On the first graph the net weekly average of the NIV is included alongside the weekly maximum and minimum NIV values. There does not seem to be an observable trend in the net average NIV value at this granularity. One observable trend is that the weekly maximum and minimum NIV are generally decreasing over time.



However, when, in the following graphs, the average NIV is split into averages of the NIV when the system is long and when the system is short, there is a more clear observed trend of decreasing average NIV over time.

Weekly Average 30 Min System Short and System Long Net Imbalance Volumes With Trendlines 01/10/2018 - 27/06/2019



As the averages, maximums, minimums, and the standard deviations have a general trend (with weekly variation) of converging towards zero, this may be indicative of the outcome desired from the NIV price signal working to some extent.

3.2.2 RELATIONSHIP WITH EX-ANTE MARKET PRICES AND RESPONSES

The analysis presented in the consultation paper nets all positive and negative NIV situations prior to averaging. This considers negative NIV situations comparable to positive NIV situations in assessing whether the price signal given by an overall average is as anticipated. If the scenarios of positive NIV and negative NIV are considered separately, the signals might be generally correct, but one signal might be stronger than the other such that when the net of both scenarios is considered the stronger overall signal is prevalent. This could give rise to unexpected results when a single average of all scenarios is considered.

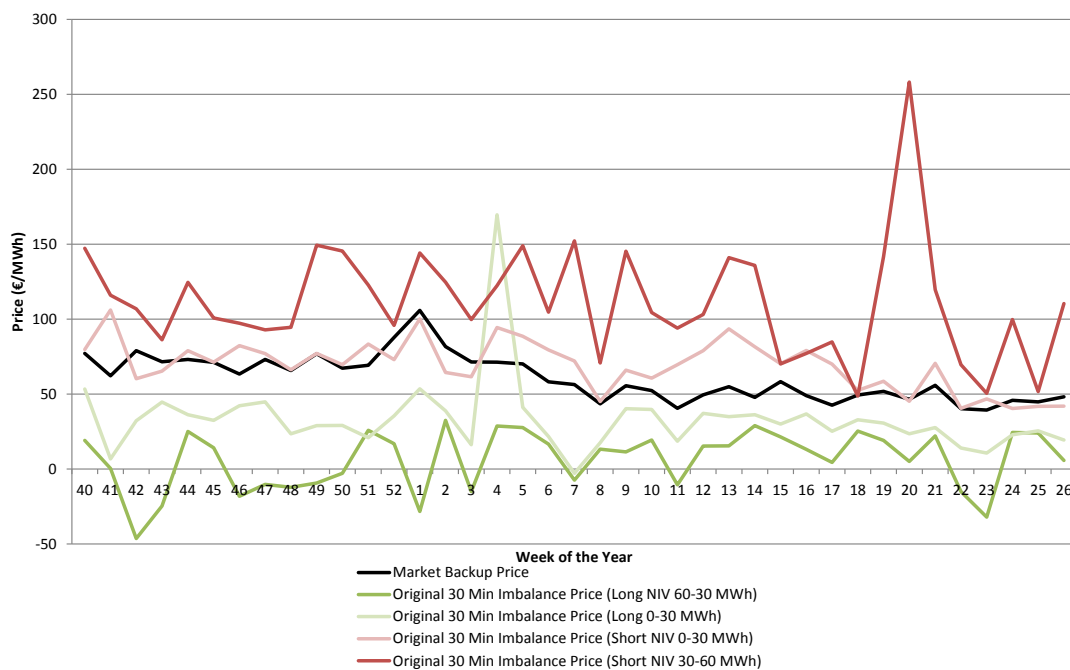
These single average values cannot account for changes which may be occurring over time due to seasonal effects or the effect of Participants responding to the price signals. It considers a start of October date very near go-live to be comparable with an end of February date in terms of determining whether the average of the Imbalance Settlement Prices over both of these periods shows the price signals intended. This granularity is useful for comparing general high level trends over time, such as year-on-year changes in prices and whether they are generally reducing or increasing, but are not as useful for determining whether the signal over that period of time is the most appropriate signal.

It would generally be expected that when the system is short the Imbalance Settlement Price would be higher than the Market Back Up Price (which is a volume weighted average of

the prices in all ex-ante market timeframes), and if the system is short by a larger extent that the amount by which the Imbalance Settlement Price is higher than the Market Back Up Price would be greater. A similar trend would be expected for when the system is long, but with the Imbalance Settlement Price being lower than the Market Back Up Price.

The following graph tries to show this, by separating the Imbalance Settlement Prices into weeks since go-live, and into the categories of when the NIV was long and when it was short. It is slightly further broken down into two bands for each NIV scenario, indicating the extent to which the system is long or short.

Weekly Average System Short and System Long Original 30 Min Price and Market Backup Price Split by Net Imbalance Volume Range 01/10/2018 - 27/06/2019

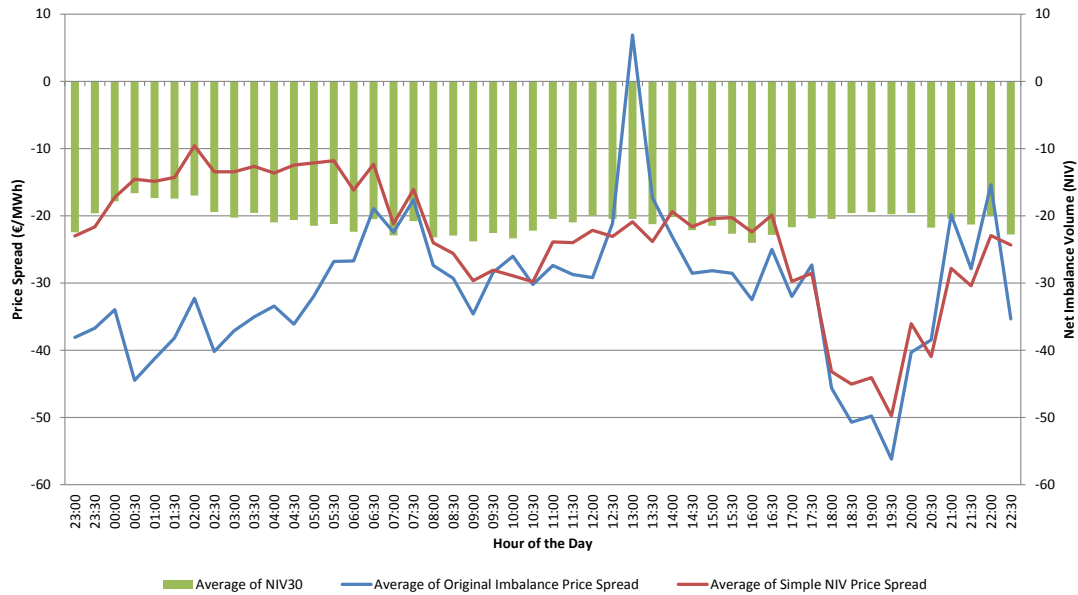


What this graph illustrates is that the expected signals appear to be in place for three of the four averages of the Original Imbalance Settlement Price, with a few exceptions. These expected signals are that the Imbalance Settlement Price would be greater than the ex-ante market prices when the system is short, and the Imbalance Settlement Price would be less than ex-ante market prices when the system is long, with the spread growing as the volume of imbalances imbalance increases in either direction. The primary exception is when the system is short in a smaller volume range, where the Imbalance Settlement Price is often around the same value as the Market Back Up Price, in some cases greater than it and in other cases less than it. The other exception is when the system is slightly long, there is a large outlier in week four, which can be accounted for by the fact that this week encompassed the 24th of January into its average.

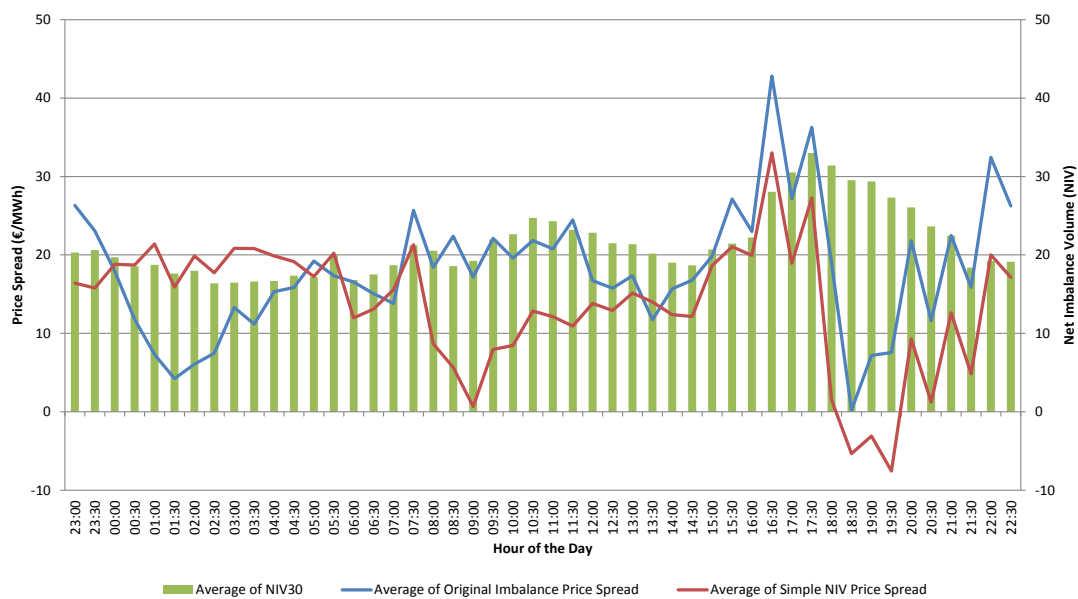
The following graphs look at the relationship between the NIV and the Imbalance Settlement Price spread against the Market Back Up Price when expressed as an average daily profile,

similar to the analysis in the consultation paper but this time split into separate cases of those results when the market is long and when the market is short. It also considers the results from both the original pricing values and those values with the Simple NIV Tagging Only analysis, in order to compare if they give the same signal, and the strength of that signal.

Daily Average Profile of NIV and Price Spread Against Market Back Up Price for Original and Simple NIV Tagging Only 30 Min Imbalance Price 01/10/2018 - 27/06/2019 (System Long)

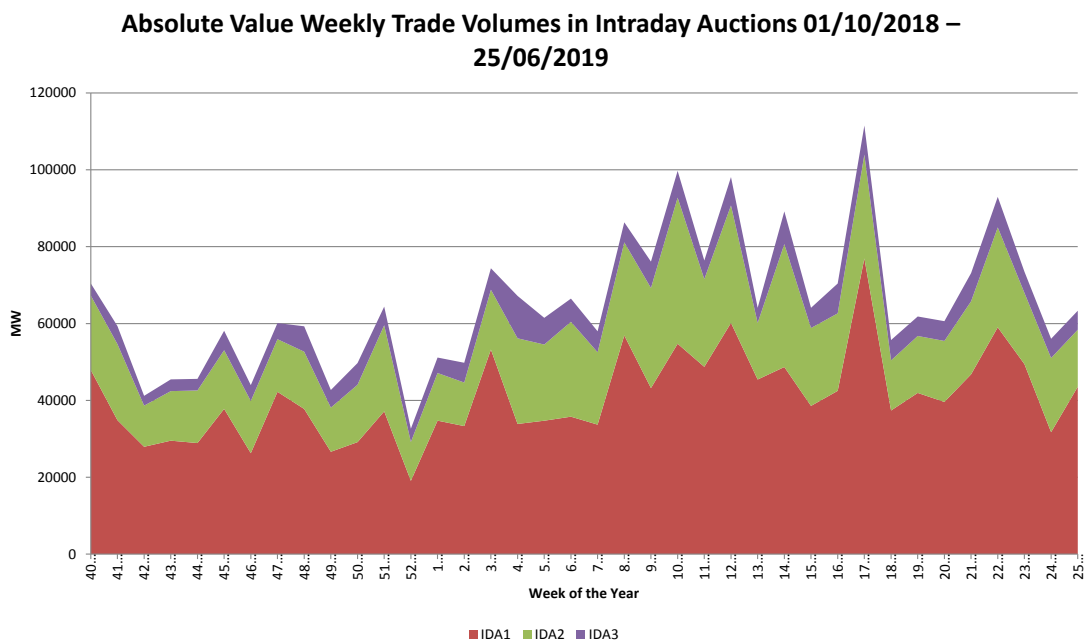


Daily Average Profile of NIV and Price Spread Against Market Back Up Price for Original and Simple NIV Tagging Only 30 Min Imbalance Price 01/10/2018 - 27/06/2019 (System Short)



These graphs seem to indicate that on average the price spread provided by the Original 30 Min Imbalance Settlement Price is in the correct direction. The signal given when the system is long seems to be very similar between the two cases, with the two exceptions of during the early morning, and one outlier for the Original 30 Min Imbalance Settlement Price at 14:00. This latter outlier can be explained by the presence of the results for the 24th of January. The early morning exception is due to the relationship between the level of curtailment and the Imbalance Settlement Price being stronger than the relationship to the NIV in these periods where curtailment volumes tend to be larger, and this relationship being stronger in the Original 30 Min Price than the Simple NIV Tagging Only price as indicated in Section 3.2.5.

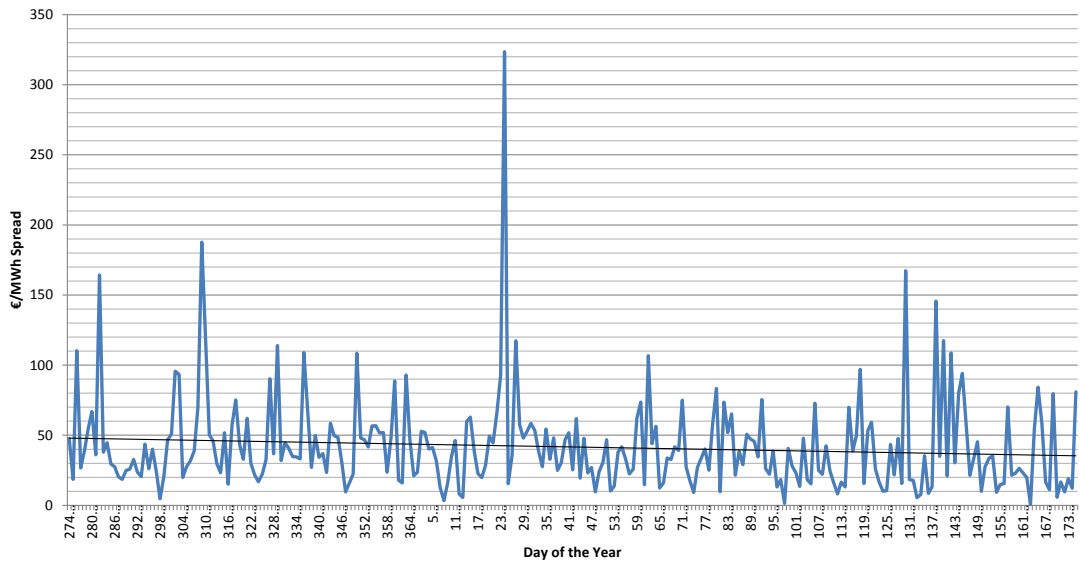
The following graph indicates the total absolute trade volumes in the intraday auctions from go-live until recently.



This indicates a lot of variation in the absolute trade volumes in the intraday auctions, however a relatively clear change can be seen between the first few weeks of the market, where the maximum sum of weekly intraday trades was around the 60000MW level, and more recent times where the minimum sum of weekly intraday trades was around the 60000MW level. The maximum sum of trades in some of these later weeks was approximately one third greater than the maximum sum of trades in the earlier weeks. In general increasing absolute volumes of trading in intraday markets is a potential indicator of good price signals observed over time in the balancing market, as it is indicative of more active trading to be in balance, responding to information closer to real-time.

The following graph shows the daily average in the Imbalance Settlement Price to day-ahead market price spread over time since go-live until recently for cases where the spread is positive.

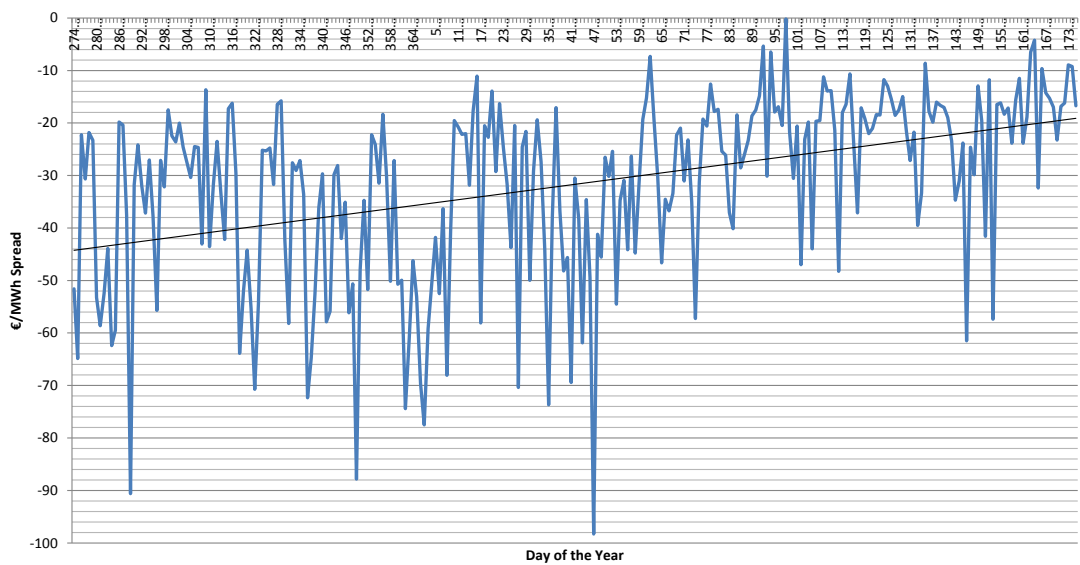
Daily Average of Positive DAM vs Imbalance Price Spreads 01/10/2018 – 25/06/2019 with Trendline



From this graph there appears to be a slight trend towards reduction in the spreads over time.

The following graph shows the daily average Imbalance Settlement Price to day-ahead market price spread over time since go-live until recently for cases where the spread is negative.

Daily Average of Negative DAM vs Imbalance Price Spreads 01/10/2018 – 25/06/2019 with Trendline



This graph indicates a very strong trend of a reduction over time in the average daily spread when the spread is negative between the day-ahead market price and the Imbalance Settlement Price.

In general reduction in the spread between the ex-ante market prices and the Imbalance Settlement Price is a potential indicator of good price signals observed over time in the balancing market, as it is indicative of trading in ex-ante markets responding to the signal in the balancing market, this response reducing the signal provided by the balancing market, until the prices are close to equivalent.

Note that it is difficult to completely associate the trends with responses to signals due to the nature of the new market only being operational for less than one year, with only a relatively short period of time to develop responses to certain signals, with changes in the pricing mechanism arising from modifications, and with improvements in the pricing system from fixing of defects. However, regardless of the reason, it is an indication that there is a trend of improvements over time. We believe that more time is required to allow for the most impactful defects to be fixed so that influence can be removed, allowing the signal and response analysis to be better carried out. A larger sample size would also help better establish the potential trend, possibly allowing the equilibrium point in the trend to be reached before determining if any more changes need to be introduced to incentivise further improvement.

3.2.3 SYSTEM DEMAND AND CAPACITY MARGIN

The impact of this metric is relatively simple compared with others which have more nuance in their signals. If demand grows higher and the scheduling of systems is following an economic merit order, it should mean that higher priced units begin to be scheduled on and dispatched up. This in turn decreases the margin of capacity not generating and still available to be further dispatched up. Capacity margin can also decrease due to units becoming unavailable for the same level of system demand. Unless these unavailable units are from the top of the merit order, this means less expensive generation can no longer be used and more expensive generation may need to be used for an increase in demand than would have been the case had the capacity margin been larger. Therefore it would be expected that as the capacity margin decreases or system demand increases, that the Imbalance Settlement Price would generally rise.

3.2.4 NET DEMAND

Considering net demand is different to separately considering the relationship of the Imbalance Settlement Price to demand and wind generation. This is because the requirement for conventional generation to ramp up and down to balance the system is not that closely correlated to only demand when in reality a high proportion of demand is being met by priority dispatch renewable generation. In addition to this demand being met by renewable generation, it is also being met through imports on the interconnector. Exports on the interconnector could be thought of as another kind of demand which needs to be met firstly by the same priority dispatch generation, and then by conventional generation thereafter.

The true ramping requirement is a combination of the change in demand (including interconnection exports) combined with the change in priority dispatch generation (and interconnection imports) initially meeting that demand. This can result in requirements from conventional generation ramping much quicker than required when responding to changes in demand alone, for example if over the same period demand is increasing and wind generation is reducing or interconnectors are moving from import towards export, the ramping requirement on the conventional generation is higher than the ramping requirement when only considering demand.

The more steep the net demand ramping requirement is, the more flexible plant, typically at a more expensive price to reflect the value of this flexibility, is required to meet that ramping requirement. Therefore having an Imbalance Settlement Price which is influenced by the net demand would be an important signal to incentivise investment in sufficient flexibility to meet these ramping requirements. It should be recognised that these ramping requirements are being seen by the SEM before it is being seen by other jurisdictions due to the difference in the relative level of penetration of non-synchronous renewable generation on the system.

3.2.5 CURTAILMENT OF VARIABLE RENEWABLES

Since renewable generation has priority dispatch on the power system, their dispatch down is related to system stability requirements. In particular for curtailment, this results in dispatch down of non-synchronous variable renewable generation when the proportion of the power it is providing towards consumption demand exports would exceed security standards, or if turning down more conventional generation would result in security standards not being met. This is a metric of particular importance in the SEM and may give rise to unique outcomes versus what has been experienced in other jurisdictions.

Because in these situations the amount of this generation which can be accommodated while maintaining system stability is a function of demand and exports, where greater demand and exports mean a greater amount of the generation can be maintained, a signal which incentivises the increase in demand and/or exports would be useful. Also, given that the security standard relates to maintaining a minimum proportion of synchronous generation on the system, a signal which incentivises a decrease in generation other than wind (in particular to address situations where generation is being kept on at their Minimum Stable Generation) would be useful.

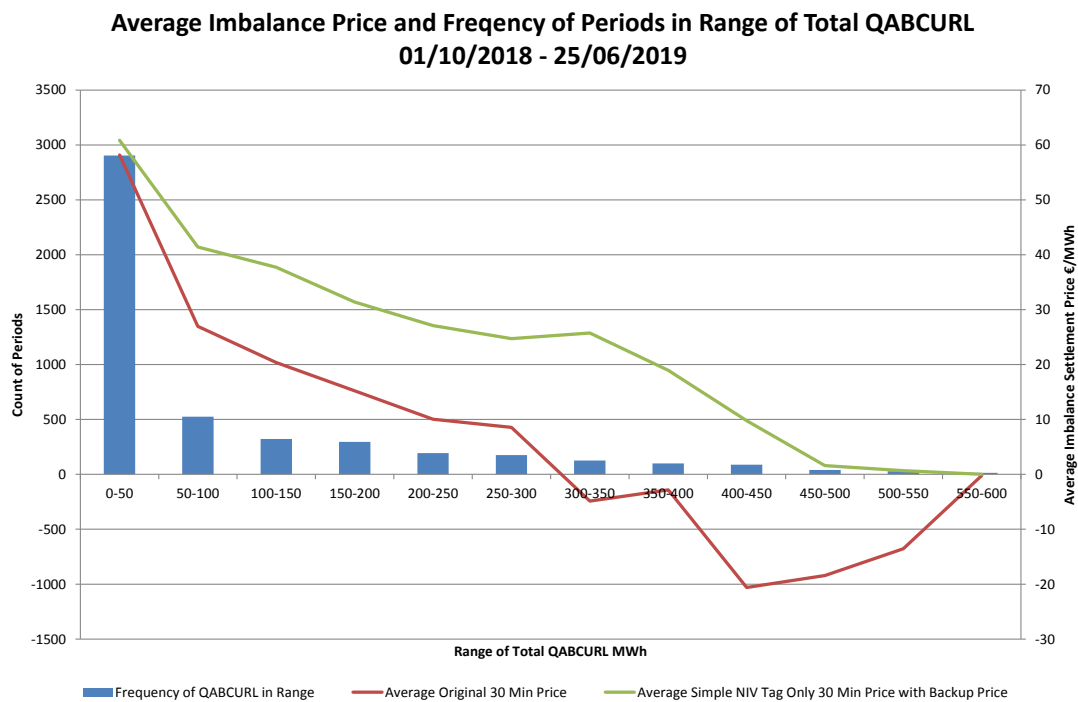
Lower Imbalance Settlement Prices in these scenarios would generally provide this signal. Generation would either be receiving a low Imbalance Settlement Price for positive imbalances (“spilling”) which may not meet their costs and therefore incentivise them to reduce this volume. The low Imbalance Settlement Price would be what all conventional generators would have to pay back to turn down, which may be lower than their cost savings and therefore they would be incentivised to make even more dispatch down volume available if possible. If they could do this while still providing the stability services required to maintain that level of non-synchronous generation on the system, such as by lowering their Minimum Stable Generation level, then it makes it more likely that they would be the unit that gets this market volume. Demand would be incentivised to consume more during

this these times as the Imbalance Settlement Price is most likely lower than is available to them at other times and in other market timeframes.

A negative Imbalance Settlement Price is an even stronger signal in this regard, where generators would be paid to turn down, generators who spill would have to pay to provide the additional power, and demand would be paid to consume more rather than paying to consume as in other times. Therefore this could be considered the correct signal, even in positive NIV situations, but whether or not the strength of the signal is appropriate can be considered.

There are some examples in the consultation paper, such as on page 9 and page 21, where it is stated that the negative or low Imbalance Settlement Prices are not an expected outcome. However it is not stated what the preferred signal would be in these curtailment situations, other than the expectation of following the signal provided by the NIV. It needs to be considered whether the signals provided by the relationship of the Imbalance Settlement Price to other inputs, in particular those related to the constrained nature of the system and high wind penetration, are of less importance than the signals provided by the relationship of the Imbalance Settlement Price to the NIV.

The following graph is intended to illustrate the correlation between the level of curtailment and the Imbalance Settlement Price from the results to date, compared with the analysis of the Simple NIV Tagging Only approach. This graph shows the average Imbalance Settlement Price when curtailment volumes are in a certain range, with the frequency of periods with curtailment volumes in that range also provided.



From this graph there appears to be a correlation between the level of constraints and the Imbalance Settlement Price under both pricing mechanisms, where the level of curtailment volume increasing coincides with a general decrease in the average Imbalance Settlement Price in those periods. The trend is not as strong at the largest levels of curtailment but this may be affected by the small sample size. In general the signal appears to be larger under the current pricing approach than under the Simple NIV Tagging approach. This may in part be explained by the presence of many more negative Imbalance Settlement Prices under the current pricing mechanism than under the Simple NIV Tagging approach.

3.2.6 SYSTEM OPERATOR BINDING CONSTRAINTS

System Operator Constraints can bind more often when either the requirement to be met is greater, or if the amounts provided (or available to be provided) is lesser. The latter of these is an item which can be improved by incentivising units to provide more, or provide an amount more flexibly. If more units provide services or provide greater volumes of services more flexibly, then they would be more likely to be selected by the TSOs (and their balancing optimisations) to be used, and have greater volumes in the energy market. Therefore incentives which encourage units to strive to be scheduled to provide a service, or to gain greater balancing market volumes in periods where the system is highly constrained, would be useful in this regard.

Different kinds of non-energy constraints would be expected to drive different outcomes in the Imbalance Settlement Price, even for the same overall level of how constrained the system is. For example, if the system is very constrained but it is primarily due to constraints which limit the output of cheaper units which would otherwise be turned up, then it would generally be expected that the Imbalance Settlement Price would go higher. This could happen with constraints to maintain minimum operating reserves for example. This is because the next units available higher on the merit order would need to be turned up when the cheaper units holding the minimum reserve requirement cannot be turned up. Those units on whom reserve is held would be flagged, and the next more expensive action in the merit order would be unflagged as the action meeting the last MWh (and therefore next MWh) of balancing energy.

Constraints which need a unit to be on at a minimum output level would be expected to have the opposite effect, where the Imbalance Settlement Price would generally be expected to go lower. This could happen for minimum number of units in a certain area of the system for example. This is because the constraint would require units to have a certain level of output even if they are not in merit and therefore would be less likely to be dispatched up any further than necessary to fulfil the constraint, with a lower priced non-constrained unit available elsewhere on the system to fulfil any further balancing energy needs. These kinds of constraints would often result in units being committed on to their Minimum Stable Generation, and since this block of energy may be larger than the minimum required to fulfil the balancing energy requirement in that period, other units would have to be backed off to maintain the overall balance. This entails incrementing less or decrementing more, in each case dispatching these unconstrained units which can set the Imbalance Settlement Price into lower areas of the merit order curve. This would have the effect of generally lowering the Imbalance Settlement Price.

High Imbalance Settlement Prices encourage trading in ex-ante markets to reduce short positions, for example if a supplier has not been purchasing enough to meet demand or if a unit tripped. When the system is more highly constrained, even at lower levels of NIV, the cost of balancing is more expensive where cheaper units are often constrained to provide certain services and therefore more expensive units must be used for balancing. Therefore a signal which encourages Participants to be more balance responsible during these times would be beneficial. A similar signal could be beneficial for low Imbalance Settlement Prices encouraging trading in ex-ante markets to reduce long positions. When imbalances increase in highly constrained scenarios, it tends to be the more expensive units which must be used for energy balancing actions, and it would be important to reflect this cost in the Imbalance Settlement Price.

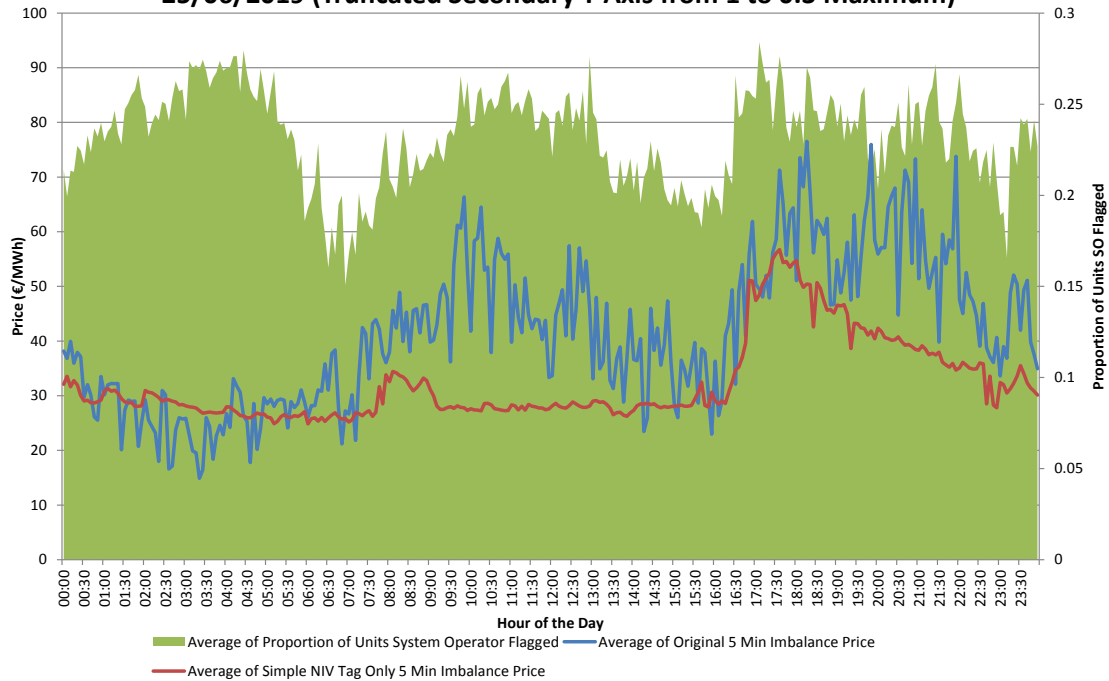
On a longer term basis than the timescales considered for changing trading behaviour, these price signals would be intended to drive responses for further provision of these services or more flexible provision of these services, for example through increased volumes of service provision, lower Minimum Stable Generation, or faster ramping levels required for providing a service.

By providing more of a particular service, a unit would make themselves more likely to be scheduled to provide this service and therefore to provide a certain amount of energy volumes in the balancing market. They would reduce the instances of the constraints binding, would increase the flexibility on the system (decrease the constrained nature of the system) and in doing so would likely contribute to a less expensive Imbalance Settlement Price in these scenarios. This would be an important signal to have if it is possible for Participants to react to it. This signal is not likely to exist in a regime where the relationship between NIV and Imbalance Settlement Price is prioritised.

The following graphs are intended to illustrate the correlation between the extent to which the system is constrained due to binding System Operator constraints being flagged, and the Imbalance Settlement Price. The extent to which the system is constrained is given by analysing the proportion of units in the Imbalance Pricing ranked set which are System Operator Flagged in each five minute Imbalance Pricing Period (i.e. for some reason have a System Operator Flag value of zero). On these graphs a value of 0 is for a period where none of the units in the ranked set are System Operator Flagged, and a value of 1 is for a period where 100% of the units in the ranked set are System Operator Flagged.

This is represented in relation to the daily average 5 Minute Imbalance Price profile, as a correlation can arise when comparing the change in Imbalance Price over the day with the change in the level of constraints over the day, combined with the knowledge of what other aspects typically impact both constraints and Imbalance Price at particular points of the day. Both the average Original 5 Min Price and Simple NIV Tagging Only Price cases are included for comparison about which would have the stronger relationship to the level of constraints.

Daily Average Price Profile for Original 5 Min Price and Simple NIV Tagging Only Price against Proportion of Units SO Flagged 26/04/2019 - 25/06/2019 (Truncated Secondary Y Axis from 1 to 0.3 Maximum)



From this graph it appears that the Original 5 Min Price has a stronger correlation with the overall level of System Operator constraints binding on the system. With the exception of the early morning period, changes in the general level of constraints seems to generally match the general level of the Original 5 Min Price, with a similar shape between the two towards the morning load rise, afternoon and evening peak. This is contrasted with the very steady average Simple NIV Tagging Only price over the afternoon, rising only towards the evening peak. In the early morning, the correlation between the level of binding System Operator constraints and the Original 5 Min Price appears to be the opposite, where the more the system is constrained the less the price. This is driven by the Original 5 Min Price's relationship with the level of curtailment on the system. It may be that due to the different kinds of constraints which can be active over these times, there is no one exact relationship of price rising with rising constraints, but different effects for different cases, where certain constraints may bind more overnight resulting in lower prices.

3.2.7 NON-MARGINAL BINDING CONSTRAINTS

Similar to System Operator binding constraints having different outcomes for different types, Non-Marginal Flagging can have different outcomes whether units are being flagged for the following reasons:

- Unit is at zero or its Lower Operating Limit;
- Unit is at its Higher Operating Limit;
- Unit is at its ramping limit;
- All quantities in bands and for instructions except for the final action are considered non-marginal.

In particular, in cases where units are predominantly being held against their Lower Operating Limit, this would be expected to decrease the Imbalance Settlement Price, while cases where units are being held against their Higher Operating Limits or ramping up limits would tend to increase Imbalance Settlement Prices.

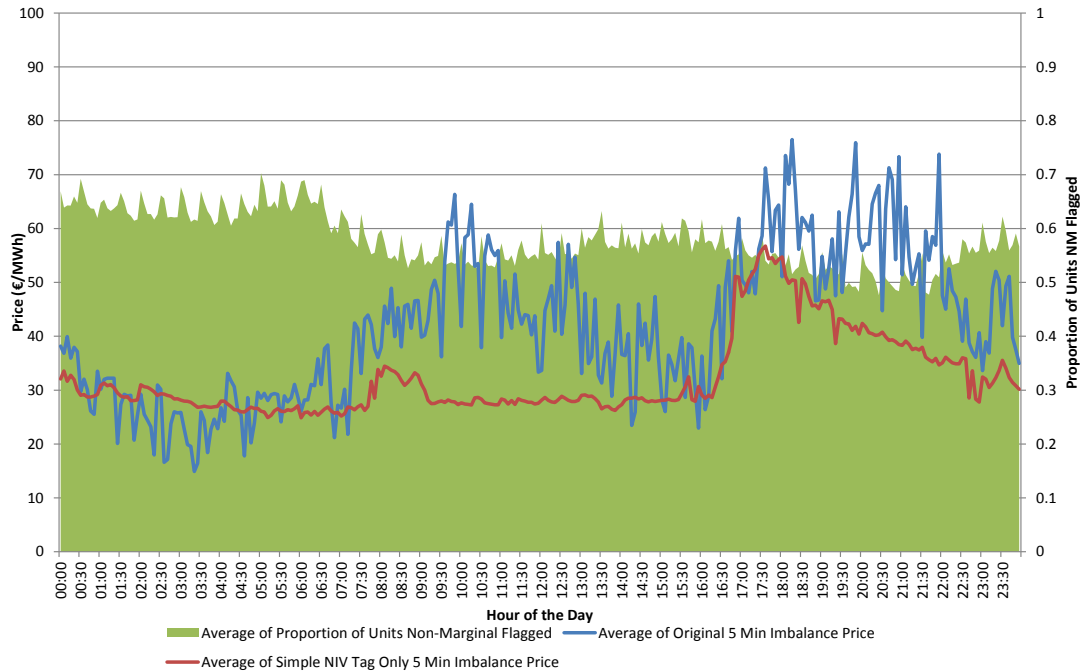
The cost of energy balancing would be more expensive at times where the system is more highly constrained due to unit technical limitation reasons, regardless of the size of the imbalance, which would be an important signal to maintain. For example around the morning load rise if more units are operating against their limitations of higher, lower or ramp limits because they are not fast acting units, then it would make sense for the Imbalance Settlement Price to reflect those fewer number of units who can respond quicker. This values the flexibility they offer.

This would often mean the Imbalance Settlement Price becoming more expensive, which should incentivise investment in greater flexibility around these times. Those units who can act quicker would be more likely to be called, and would have greater volumes available to them. It would be expected for Lower Operating Limits to be the primary Non-Marginal Flag applying overnight, in which case decreased Imbalance Settlement Prices would be intended to encourage units to lower their Minimum Stable Generation. This way units can increase their decremental volumes or decrease their incremental volumes being settled at the lower Imbalance Settlement Price, and potentially make themselves more likely to be the price setting unit or in-merit with other price setting units, rather than being out-of-merit due to the large block of output required at Minimum Stable Generation.

The following graph is intended to illustrate the correlation between the extent to which the system is constrained due to Non-Marginal constraints being flagged, and the Imbalance Settlement Price. The extent to which the system is constrained is given by analysing the proportion of units in the Imbalance Pricing ranked set which are Non-Marginal Flagged in each five minute Imbalance Pricing Period (i.e. for some reason have a Non-Marginal Flag value of zero). On these graphs a value of zero is for a period where none of the units in the ranked set are Non-Marginal Flagged, and a value of 1 is for a period where 100% of the units in the ranked set are Non-Marginal Flagged.

This is represented in relation to the daily average 5 Minute Imbalance Price profile, as a correlation can arise when comparing the change in Imbalance Price over the day with the change in the level of constraints over the day, combined with the knowledge of what other aspects typically impact both constraints and Imbalance Price at particular points of the day.

Daily Average Price Profile for Original 5 Min Price and Simple NIV Tagging Only Price against Proportion of Units NM Flagged 26/04/2019 - 25/06/2019



There seems to be a slight correlation where a reduction in the level of units non-marginally constrained coincides with an increase in the Original 5 Min Price. There is no clear correlation between the Simple NIV Tag Price and the level of units non-marginally constrained. On average over the course of a day, the most units are constrained overnight, with this reducing over the morning load rise and evening peak. This would be expected, as the lower demand overnight coinciding with a need to maintain system security (in particular with voltage, inertia, and minimum number of units constraints which are primarily related to just having a unit on rather than on at a particular output level), would often result in conventional units being committed off, or on but only to their Lower Operating Limit.

As demand picks up, such as over the morning load rise and evening peak, the units committed on the system may be lifted off their Lower Operating Limit. Other units would be switched on to output levels primarily reflecting the energy requirement rather than security standard requirement, reducing the number of units against Lower Operating Limits. The cheaper units should be dispatched to the greatest extent possible. While the overall level of Non-Marginal Flagging may be reduced over the morning load rise and the evening peak, given the types of actions being scheduled and dispatched on units over those times it is likely that the type of Non-Marginal constraint binding on units during these times are ramp limits or Higher Operating Limits. This would be expected to increase the Imbalance Settlement Price.

3.2.8 INTERACTIONS BETWEEN MULTIPLE METRICS AND SIGNALS AT THE SAME TIME

While on a 5 minute basis there is often noticeable volatility in how the price changes, the average half hour price may be an accurate reflection of a unit being somewhat used for energy and somewhat used for non-energy, or sometimes marginal and other times not marginal. A unit becoming marginal or having a System Operator Flag removed for a number of 5 minute periods, but not all, influences the average price to move towards theirs but not completely at their price level across the whole period as would be the case if flagging was switched off. Consideration needs to be given to the intended outcome in this regard under numerous circumstances, for example is there one signal stronger than all others and if that is the case the Imbalance Settlement Price should entirely reflect that signal? Or should the approach be one which acknowledges all of the signals present and attempts to incorporate their influence on the Imbalance Settlement Price? Answering these questions would help with determining the characteristics of the preferred pricing mechanism.

As the signals provided by the relationship with the other metrics start to be acted upon, then the strength of the signal in the Imbalance Settlement Price provided by that relationship will diminish, and the signal in other relationships will become the stronger one. This is an important dynamic to include in Imbalance Pricing. For example, under the Simple NIV Tagging approach, if the signal in the Imbalance Settlement Price to reduce the NIV is responded to such that it has diminished towards nothing and there are only tiny or no imbalance volumes, then there no longer remains any strong signal in the Imbalance Settlement Price. Because no other fundamentals are considered in influencing the price signal, the Imbalance Settlement Price would remain consistently benign with low NIV levels even when high priced units are used for balancing. Under the current mechanism there still remains strong signals related to other metrics such as the need for flexibility to reduce the constrained nature of the system which means that even at potentially low NIV, if the system or units are so constrained, or the rate of need of balancing actions are such, that expensive actions are being used then this can be reflected in the Imbalance Settlement Price.

For example, it seems from figure 11 on page 27 of the consultation paper that the primary difference in the signal provided by each price is overnight, in particular related to curtailment during high wind / low net demand situations and where the system is highly constrained. It is implied from other sections of the consultation paper that this is an unexpected outcome because of the average level of the NIV in those times. It needs to be considered at a more principled level whether the signal of a lower Imbalance Settlement Price than day-ahead market price, even in periods with positive NIV, is an important one to maintain to provide incentives for the treatment of wind and curtailment, or if the relationship of the NIV and the Imbalance Settlement Price is more important and should be strengthened.

3.3 DEFINITION OF MARGINAL UNIT

The definition of marginal unit given in the consultation paper on page 14, being based on “the unit which provided the last MWh of energy which met the NIV” seems to be different

to the actual definition given in the HLD, which describes the concept in paragraph 4.5.14 as the “cost for generating one more or one fewer MWh of electricity within the BM timeframe”, and the “nextmost expensive resource (generation or DSU) used to meet demand (i.e., provide balancing energy)”. The Detailed Design also had a similar definition for marginal price to the High Level Design, in Section 8.2 describing that it “reflects the cost for generating one more or one fewer MWh of electricity within the BM timeframe”.

The detailed design and rules development process did make a connection between the last MWh being the equivalent of what would provide the next MWh, however this was in the context that any Bid Offer Acceptance which could not actually provide the next MWh would be Non-Marginal Flagged out and therefore not considered. The only “last MWh” actions considered for setting the Marginal Energy Action Price would be the ones which could feasibly provide the “next MWh”; therefore, excluding units against higher, lower or ramp limits, or any Bid Offer Acceptances other than the last one taken on the unit. In order to have an approach where the marginal price is considered the action which would provide the next MWh of balancing energy while calculating this based on the last MWh of balancing energy actually accepted, some form of Non-Marginal Flagging approach is required.

Therefore, we believe the SEM Committee should consider this application of Simple NIV Tagging a change in this aspect of the design of the market.

Rather than an approach which aims to reduce volatility by simply removing Non-Marginal Flagging, we believe an approach which considers changes that focus on the cause of such volatile outcomes should be followed. For example flagging could be maintained but adjustments investigated in order to assess if it can be more accurate – this may not require a change in the definition of the marginal energy action. There is no statement of what the Regulatory Authorities believe is the correct outcome in many of the situations discussed in the consultation paper, other than the view that the volatility is undue and this can be corrected through wholesale changes in the Imbalance Pricing mechanism.

The question of turning on or off Non-Marginal Flagging in whole, or adjusting it in part, could be considered separately to the question of turning on or off system-operator flagging. Thinking about the fundamentals of pricing and what it means to turn off Non-Marginal Flagging, it would mean that a unit who is at its maximum or minimum output, or is at its ramping limits, or has orders at prices (in COD bands) other than the last one in which the unit was outputting, would be able to set the Imbalance Settlement Price. This means that pricing is no longer based on the next action which would be used in order to meet the next imbalance on the system; rather, it will only be based on actions taken to help meet the imbalance. It needs to be considered if situations such as a unit at its max output being able to set the marginal Imbalance Settlement Price are the desired outcome.

3.4 DEFINITION OF NON-ENERGY ACTIONS

There are assertions that actions are being taken for non-energy reasons, but then they are later not being flagged, which suggests that the process is not working as intended or anticipated. One example of this in the consultation paper is on page 6, which notes that BGT2 “had initially been dispatched out of merit for non-energy reasons due to the amber alert”.

As explained during the detailed design, it is not possible to 100% denote whether a unit is being used for energy or non-energy reasons based on a simple description of the event without being subjective. For example, if the NIV shows that the market is short, a unit being turned up will naturally help meet the energy balancing requirements of this short market, although that particular unit may have been scheduled in order to maintain the minimum number of units required in a particular area of the network. In this case, should this unit be prevented from setting the energy price because it is being used for non-energy reasons? Or should it be able to set the price because it is meeting the energy requirement, and the price needs to be set based on the actions taken by the TSO?

Since units could be considered providing both energy and non-energy actions at the same time, an automated algorithmic approach based on the most up to date indicative operations schedule, and based on the actions in each separate 5 minute period rather than the initial dispatch of the unit, was the approach adopted to determine whether the action in each period is energy or non-energy. This approach can do this assessment without subjectivity based on the mathematics of the optimisation that considers using units for both energy and non-energy reasons at the same time and how this changes over time.

Having such an approach may give rise to volatility, in that a unit could be seen as being used predominantly for non-energy in one period, energy in the next, and cycling between these in being able to set the Imbalance Settlement Price. This volatility may be an accurate reflection of the fact that the unit is being used for both reasons at the same time, and to consistently consider the unit being used for one reason over the other may not be an accurate reflection of the use of the unit. It would be important in an analysis to change the pricing mechanism to determine if this volatility is undue, or if it reflects the circumstances of the system, rather than simply stating that the level of volatility experienced to date is undue because it seems like a high level of volatility compared with what was expected.

Care should be taken in determining if more caution should be shown to more consistently flag a unit for non-energy purposes over this period, or if they should see the benefit of having met the energy requirements and more consistently allowing it to set the Imbalance Settlement Price by not consistently flagging the unit. The decision to turn off flagging may not actually lead to the outcome desired in terms of accurate determination of non-energy actions; rather, it just changes the outcome in terms of the resulting volatility without addressing the fundamentals.

In the case of considering whether an expensive unit cycling between energy and non-energy and switching off System Operator Flagging in this context, it would mean that the unit would be seen as energy balancing predominantly in all periods, which would mean it would be likely for it to set the Imbalance Price in even more periods. Care needs to be taken in determining whether that consistently expensive Imbalance Price, consistently considering the unit as being used for energy balancing reasons, would be preferred over an expensive Imbalance Price occurring less often with higher volatility. Similar logic could be applied in considering the intended outcomes for units causing volatility due to cycling between being considered marginal and non-marginal. Note that having a more consistently expensive price, rather than one which cycles more often, could have the impact of increasing Dispatch Balancing Costs through increase Premium or Discount payments.

The market power mitigation decision was intended to mitigate against market power for non-energy actions. It was not intended to mitigate against market power for energy actions, which were explicitly stated as not subject to this strategy. Therefore the understanding that the units in Northern Ireland were incorrectly not being mitigated on January 24th because they were not flagged or tagged, as asserted on page 17 of the consultation paper, is only valid if it is believed that the units were used for non-energy reasons. However as already pointed out on the SEMO report about the 24th of January, these units were not flagged precisely because they were identified by the Real Time Dispatch (RTD) tool, using the automated objective algorithmic approach, as being used for energy balancing reasons in those periods, rather than binding non-energy reasons. Given the level of constraints on the system, the units available and the congestion on the North South tie-line, these were the units that could provide the next MWh of balancing energy, and therefore weren't flagged.

In that situation because only units in one area of the system could provide that next MWh of energy, it could be perceived that there could have been temporary local market power. However under the current definition of what is a non-energy action, this is potential market power in energy balancing, not in non-energy balancing as was the requirement under the detailed design for market power mitigation. Therefore, if Simple NIV Tagging is being introduced as a means of mitigating those units in this scenario, it will also mitigate against market power in energy balancing.

If Simple NIV Tagging is being introduced on the assumption that these actions taken on January 24th were non-energy and should have been identified as such, then this is a change in the definition of what is "non-energy", from being based on the fundamentals of power system constraints to being based on an assumption that expensive actions are non-energy actions.

3.5 IMPACT OF CHANGE ON DISPATCH BALANCING COSTS

This change may have unintended consequences for Dispatch Balancing Costs. The views provided here are from a qualitative perspective, as it was not possible in the time available to forecast the potential Dispatch Balancing Costs under each mechanism.

At a high level, the potential impacts on Dispatch Balancing Costs are around the definition of which actions are considered non-energy, and changing the definition of the Imbalance Settlement Price reflecting the marginal cost of energy balancing. In both cases, there is a certain theoretical basis for each of these definitions that if a change from the current pricing mechanism towards Simple NIV Tagging were to be carried out would result in a less fundamental, more assumptions-based approach to defining these aspects. The potential impacts would be cases where actions are currently considered non-energy, but under the new mechanism would no longer being considered so, and on cases where the Imbalance Settlement Price becomes less reflective and more benign versus what would currently be considered the marginal cost of balancing energy. There are two primary impacts changing the pricing mechanism could have on Dispatch Balancing Costs:

- Imbalance Settlement Price effect: Dispatch Balancing Costs primarily result from settlement of units at Bid Offer Acceptance Prices above the Imbalance Settlement

Price for incremental actions and below the Imbalance Settlement Price for decremental actions. These are settled through Premium and Discount Component payments, which are payments to ensure units who have a Bid Offer Price which is more beneficial than the Imbalance Settlement Price are net settled at that more beneficial price. Therefore the level of the Imbalance Settlement Price will have an impact on the overall level of DBC. In some cases a change in Imbalance Settlement Price would lead to a decrease in costs, while in other cases it would lead to an increase in costs;

- System Operator Flagging and NIV Tagging Market Power Mitigation effect: This has the effect of changing the Bid Offer Acceptance Prices considered in settlement, based on a change in the definition of what is considered a “non-energy action”. If this were to affect the costs it would be expected to increase them.

While it is difficult to forecast the potential quantitative impact of this change to feed into this response, it was noted as part of the discussions on MOD_09_19 that from high level analysis carried out by the TSOs, the removal of flagging for the MWR constraint would be expected to have a net increase in Dispatch Balancing Costs.

3.6 ANSWERS TO CONSULTATION QUESTIONS

Considering the points made in this response, the following short answers are given to the consultation questions.

2.1) Do you support this Simple NIV tagging option and its implementation in the SEM?

- We do not support implementing this Simple NIV Tagging option. We believe a longer period of experience of the I-SEM arrangements, particularly taking account of the implementation of a modification (MOD_09_19) intended to mitigate the same concerns, is needed before considering changes of this nature;
- We believe further work and analysis in addition to that which was presented in the consultation paper would need to be undertaken to justify any significant change to the pricing approach. EirGrid and SONI would be keen to assist the SEM Committee in carrying out further analysis and identifying potential alternative solutions if required;
- We have outlined our concerns about the context of this proposal in Section 3.1, and thoughts on the further analysis and potential options available in Section 3.2.

2.2) Do you have any concerns regarding moving to Simple NIV tagging in the Balancing Market, including the risk of unintended consequences? If so, please explain these concerns.

- We have a concern that the move to Simple NIV Tagging puts all focus on the relationship between the NIV and the Imbalance Settlement Price at the expense of other important price signals reflecting the fundamentals of the power system;
- We have outlined explanations of these signals and how important it is to maintain them in Section 3.2, where we also present analysis to demonstrate the signals which would be lost by moving to Simple NIV Tagging;
- We are concerned about the potential unintended impacts this would have on Dispatch Balancing Costs, in particular considering the impact of the Imbalance Settlement Price in Premium / Discount calculations, and the impact of the change

to the definition of non-energy actions for the Market Power Mitigation approach of settling units on their regulated Commercial Offer Data. We have outlined thoughts on this in Section 3.5.

2.3) Do you agree or disagree that Simple NIV tagging meets the I-SEM High Level Design, the I-SEM Detailed Design and the I-SEM market power mitigation decision? If you disagree, please explain why.

- We do not agree that Simple NIV Tagging could be interpreted to meet the high level and detailed designs in all ways. It would require a change in the definition of certain items away from what is stated in these designs, including the definition of what is considered the marginal unit/action, and what is considered a non-energy action. We highlight particular concerns on these topics in Sections 3.3 and 3.4;
- Considering the most expensive actions in the direction of NIV as non-energy may not reflect the system conditions. NIV Tagging will systematically assign non-energy status to the more expensive actions. There are many cases where this is correct; however, there are also many cases where the more expensive actions are those that are being used for energy balancing;
- We believe that removing flagging removes a considerable amount of information from the Imbalance Settlement Price. This information reflects the constrained nature of the all-island system in the presence of high penetration of variable renewables. Removing this signal from the market will have significant impact of reducing the value of flexible resources in the balancing market, which we believe would not be intended by the high level or detailed design. We have outlined more thoughts on this in Sections 3.1 and 3.2.

2.4) Do you agree or disagree with SEM Committee's assessment that the pricing outcomes under Simple NIV tagging are preferable, given market fundamentals? If you disagree, please explain why.

- We do not agree with this assessment. We believe further analysis would be needed to be able to make these conclusions, including a more stable study period, metrics for additional price signals, additional options of changes to implement, and different ways of presenting the analysis;
- It is also important to remember that the analysis carried out of the Simple NIV Tagging results does not represent real outcomes, and are missing important components on feedback and knock-on effects, such as how prices in following periods respond with changed behaviour to prices in earlier periods;
- We have outlined in Section 3.2 our views on the analysis presented in the consultation paper, and have provided additional analysis to give a few examples of what we believe would be required.

4 REMOVAL OF DIFFERENCE CHARGES WHERE OPERATIONAL CONSTRAINTS ARE BINDING

4.1 HIGH LEVEL VIEWS AND GENERAL COMMENTS

We believe that the proposal in this section would be appropriate to implement, given the concerns on the potential exposure to high Imbalance Settlement Prices in Capacity Settlement, and the fact that the approach considers the main drivers of the outcomes. This allows for the signals in the Imbalance Settlement Price to be maintained, while addressing the concerns about the ability for Participants to respond in a way which meets their capacity obligations without unintended consequences. Therefore if there are concerns with more extreme specific situations potentially arising even after MOD_09_19 has been implemented, since this is the settlement item most strongly impacted by such events, it would make sense to target a solution in this area rather than a much broader wholesale change of the Imbalance Pricing mechanism.

As outlined in comments at the Trading and Settlement Code Modifications Panel Working Group on MOD_32_18 where this proposal was raised, there are concerns around the potential impact this proposal could have on the differences between payments and charges and therefore the Socialisation Fund. It is difficult to assess what would happen in general, and in the analysis of implementing this approach to the two practical past examples provided one was shown to result in a shortfall, while the other results in a surplus which was smaller than the actual surplus recorded. However, we believe this approach strikes a balance better than other potential options such as more purely availability-based approaches to determining this exposure.

Note that with the current system implementation, this approach can only apply to those constraints which are included in System Operator Flagging under Imbalance Pricing. The System Service Flag process relies on the System Operator Flag process being switched on in pricing in order to use the results of that process to also create the results for the System Service Flag. To have a different implementation approach where System Operator Flags can be turned off for specific or all constraints, but would still create System Service Flags for them, would require a change request which is likely to reduce its value as a potential shorter term solution.

This could be a means around the issue as presented on page 51 of the consultation paper, of the potential for a hidden locational element in the Capacity Market. To take the example of the 24th of January, we understand this concern to mean that if a Participant was responding to the signal of the high Imbalance Settlement Price on that day by investing in additional capacity, if they were to clear in the capacity auction and develop in an area on the export limit side of the constraint, i.e. Ireland in this case, they could have made the situation worse. This is because they could be driving further flows from Ireland to Northern Ireland, and further exports from the SEM via the interconnectors, which if all other aspects are equal would look like a continuation of some of the drivers for the situation on January 24th. When the constrained balancing market results in the unit's output being limited due to the North-South tie-line constraint, if the unit is System Service Flagged in this case then they have potentially made the system situation worse in further driving network flows from

Ireland into Northern Ireland, hitting the limits of these flows, but are not exposed to the outcome of this if the Imbalance Settlement Price rises above the Strike Price.

However, if they were not System Service Flagged due to this transmission constraint, chances are that the unit would be more incentivised to develop in Northern Ireland. This is because in this situation, by investing there, they would increase their chances of being called in the Balancing Market, reducing their Non-Performance exposure and increasing their balancing market volumes. This would improve the system situation as it would reduce the potential for South to North flows becoming constrained by having more generation in Northern Ireland.

If the basis for the System Service Flag was aligned with the current basis of the System Operator Flag, in that limits to output of a unit due to upper MW limits on the Transmission System are not considered, then this potential longer term concern should not arise, but the shorter term risks to those units not being called in the balancing market due to being on the export end of the network constraint would still remain. Therefore it needs to be carefully considered if the intention is to include a reduction in exposure due to locational network constraints, or only due to system service related constraints, which are not likely to have the same potential locational signal issue. It may be considered a balance that the removal of these constraints from System Operator Flagging reduces the potential for the high Imbalance Settlement Price events occurring, and therefore the need to include them in System Service Flagging may be reduced.

In either scenario, we believe this could be interpreted as being in line with the decisions in the Capacity Market detailed design. While the design discussed units who were providing services as ones which are protected from non-performance difference charges, this is primarily meant to cover units who would have generated more power had they not been dispatched to a certain level due to a system service. They are typically providing a volume of this system service between that output level and their availability, in particular when considering reserves, and therefore services such as inertia which require units to be scheduled to a minimum output level would not be appropriate to consider under this approach.

Most of these services which limit the outputs of a unit are implemented as constraints in the optimisation. However, there are other constraints which work in a similar way to limit a unit's output without necessarily being tied to the provision of a service with a specific contract, but is still of benefit to the system as opposed to the unit themselves. Therefore rather than tying the approach to the provision of a service, the approach can be thought of instead as equivalent to a unit having its output limited by a System Operator constraint binding on it.

4.2 ANSWERS TO CONSULTATION QUESTIONS

Considering these points, the following short answers are given to the consultation questions.

3.1) Do you support this Capacity Market option and its implementation in the SEM?

- We agree that this approach could be implemented as a means of mitigating concerns around the exposure to Difference Charges in cases where the Imbalance Settlement Price rises above the Strike Price. It can do so while adhering to the detailed design of the capacity market, as it still requires the delivery of a volume. It only further protects units when that volume they are delivering is a system service volume, or if they are prevented from delivering an energy volume due to a system constraint rather than some other element which may be within their control.

3.2) Do you have any concerns regarding the removal of Difference Charges where Operational Constraints are binding, including the risk of unintended consequences? If so, please explain these concerns.

- We would have concerns over the potential impact it would have on the balance between Difference Charges and Difference Payments. In general this would result in a reduction in Difference Charges to help meet Difference Payments. It is difficult to assess whether in general this would potentially result in situations where there is a shortfall and therefore resulting in the use of the Socialisation Fund. Therefore this could result in additional unintended consequences which could not be forecasted at this time;
- However this option is less concerning in this regard than other potential options based more purely on unit availability.

3.3) Do you consider this proposed change is in keeping with the broader CRM detailed design? Please explain your view.

- The primary intention with the design of the Capacity Market is for Participants to meet their obligations through trading to deliver energy in either of the energy market timeframes. If units are turned down from this position due to provision of a system service, this should not count against them. This is reflected by not including negative balancing market quantities when calculating Difference Charges. During the design of the I-SEM, it was decided that the System Service Flag would be included to also protect units who do not typically participate in the market in this way, but do provide a system service which could limit the amount by which they are dispatched in the balancing market;
- Given the experience of the market since go-live, we believe it is valid to consider extending this approach of protecting units who are unable to be dispatched up in the balancing market driven by system constraint reasons. Whether or not this should include only system services, such as reserves, or also include system transmission constraints, we believe that this can be interpreted as being in keeping with the detailed design. Which approach is chosen by the SEM Committee can be based on the desired balance between the signals provided by protecting against certain constraint types, and the desired level of protection to give in those situations.

3.4) Do you have any views on this option from a consumer perspective?

- This approach increases the risk of the need to use the Socialisation Fund, as the primary impact it has is a reduction in the Difference Charges to help meet

Difference Payments. This increases the risk to consumers that they may not fully avail of their hedge against the Imbalance Settlement Price, at least in the short term, if the fund is being used to the point where a “suspend and accrue” approach may need to be considered;

- It is difficult to assess what the theoretical impact would be for any potential situation where the Imbalance Settlement Price rises above the Strike Price. However if this approach is implemented, we believe it would be appropriate to monitor the outcomes and potentially consider further adjustments and clarifications, within what is interpreted as meeting the detailed design, to the approach if unintended or undesired consequences arise.

3.5) Do you have a strong view regarding an alternative option which could be implemented, i.e. preferably requiring only a configuration change rather than a system change?

- We believe the primary requirement of the Capacity Market needs to be maintained, that the means of a Participant meeting their capacity obligations is the delivery of energy volumes between any of the market timeframes. We don't believe an option based purely on their theoretical availability to provide these volumes is sufficiently in-keeping with the intended Capacity Market design. While the proposal in the consultation paper aligns with these views, if alternative proposals are to be considered we believe it needs to be within this context.
- We would note that depending on the exact configuration of the approach presented in the consultation paper, i.e. which exact constraints it is intended to flag, then there is the potential requirement for a system change in addition to the configuration element. This is particularly the case if System Service Flags are intended for constraints which are not System Operator Flagged in the pricing mechanism.