Review of Recommended Values for Scheduling and Dispatch Policy Parameters 2023

Long Notice Adjustment Factor & System Imbalance Flattening Factor (LNAF and SIFF)

Report to the Regulatory Authorities
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1 Licence Obligation

This Long Notice Adjustment Factor (LNAF) and System Imbalance Flattening Factor (SIFF) Parameters Proposal, for calendar year 2023, is being submitted by EirGrid and SONI, in their roles as the Transmission System Operators (TSOs) for Ireland and Northern Ireland, to the Commission for Regulation of Utilities (CRU) & the Utility Regulator for Northern Ireland (UR).

In accordance with SONI TSO licence condition 22A part 7 and EirGrid TSO licence condition 10A part 7, we are obliged to provide a report annually or as requested by the Authority/Commission as detailed in the condition below:

> '*The Licensee shall provide a report to the Authority/Commission on an annual basis, or whenever so required by the Authority/Commission, on the performance of its scheduling and dispatch process resulting from the current values of the scheduling and dispatch policy parameters. The Licensee may propose changes to the values of those parameters, or their replacement with different parameters. After publication of the Licensee's report and following consultation with such persons as the Authority/Commission believes appropriate, the Authority/Commission may determine that the values of the policy parameters shall change, or that different policy parameters shall be used. Such a determination shall specify the date from which any such changes shall take effect and may specify transitional arrangements to be applied by the Licensee.*'

To meet the obligations of the licence conditions, we are providing this report on the performance of the current scheduling and dispatch parameters known as the LNAF and the SIFF. In this report we also recommend the LNAF and SIFF values for the calendar year 2023.

2 Terms and Definitions

The LNAF, SSII and SIFF terms are defined in Table 1 below. The LNAF and SIFF definitions are as outlined in the SONI and EirGrid Transmission Licences.

Term	Definition
LNAF	Long Notice Adjustment Factor – A multiplier applied to the start-up costs of generation sets which varies depending on the length of notice provided in any instruction from the Licensee to synchronise such generation set and which has greater values for greater lengths of notice.
SSII	System Shortfall Imbalance Index – Is the ratio of the total of any energy shortfall over a Trading Day (the sum of energy shortfalls in each Imbalance Settlement Period) divided by the total energy demand forecast for the Trading Day. SSII takes the form of a real number between 0 and 1. Zero indicates no shortfall. A value of 0.01 indicates a 1% energy shortfall for the Trading Day.
SIFF	System Imbalance Flattening Factor – A multiplier applied to the start-up costs of generation sets which varies depending on the degree to which forecast generation including forecast imports and forecast exports on Interconnectors is short of forecast demand and which has greater values for greater shortages.

Table 1: Terms and definitions.

3 Background of LNAF and SIFF Parameters

3.1 Intent of LNAF and SIFF Parameters

One of the SEM objectives is that the day-ahead and intraday markets should be the primary mechanisms by which the energy supply/demand balance is resolved. If the market finds a balanced energy position through the ex-ante markets, the need for TSO energy actions will be minimised.

In the SEM arrangement the balancing market opens after the completion of the day-ahead market. This is to allow the TSOs to begin to schedule units to maintain a secure system based on the day-ahead market results. As a consequence, the balancing market and intraday market are open at the same time. The balancing market and intraday market being open at the same time require the establishment of the following objectives:

- Insofar as it is possible, energy balancing actions should be deferred as much as possible until after the Balancing Market Gate Closure, and the ex-ante markets should be left to resolve the energy supply/demand balance.
- The TSOs should not take any action prior to the balancing market gate closure unless it is for reasons of system security, e.g. for reserves, for priority dispatch, or for other statutory requirements.
- Costs for both constraint (non-energy) actions and energy actions should be minimised.

If the market finds a balanced energy position through the ex-ante markets, the need for TSO energy actions will be minimised. However, if the market is not balanced, there is a risk that the proposed approach could result in "early" actions (i.e. TSOs, based on Commercial Offer Data (refer to Trading and Settlement Code for definition), may have to call the long notice units and will need to do this before the gate closure) that could dilute the signals to market participants to be balanced or appear to impact on the intraday market. Therefore, the problem is obeying the main objective outlined above while minimising costs and deferring energy balancing actions as late as possible before the gate closes. The solution is to include two process factors – LNAF and SIFF. These design parameters deter the TSOs' optimisation tool from scheduling early commitment actions in the scheduling process, by making such actions artificially more expensive to the optimisations, and instead allowing more time for the ex-ante markets to resolve the energy supply/demand balance

3.2 Function of LNAF and SIFF in the Scheduling Tool

The LNAF and SIFF apply a weighting to the start cost of the offline generators to deter the TSOs' scheduling tool from taking early commitment actions in the scheduling process's optimisation. These parameters force the optimisation to favour short-notice units over long-notice units as short-notice units will appear to the scheduling processes to cost less than long-notice units. These parameters lead to the TSOs not having to commit long-notice units early over short-notice units. Therefore, given the choice of a number of resources with the same cost, by applying the LNAF and SIFF, the shorter notice resources will be favoured in the scheduling processing tool.

These units with long notice requirements will have an additional incentive to trade in the intraday market rather than wait to be scheduled by the TSOs. The LNAF and SIFF could also incentivise units to reduce their notice times where this is technically and economically feasible.

The process and calculation methods by which the LNAF and SIFF are incorporated into the scheduling tool is outlined in Appendix A below.

4 LNAF and SIFF Parameter Review

We have carried out a review of the scheduling processes based on the intent of the LNAF and SIFF parameters. This review focused on the parameters in the context of current security of supply concerns, new operational trial, and audit outcomes. Table 2 below outlines a summary of the findings of this review and the justifications for keeping the LNAF and SIFF parameters at zero, as per last year's recommendation.

Area of Analysis		Summary of Findings resulting in the Recommended Values
1	Security of Supply: **Lack of Generator Unit Choice**	There is currently a risk to security of supply. At present when the wind generation is low, there are limited options to choose between units, whether they are longer notice or shorter notice units. The TSOs' optimisation tool does not often have flexibility to choose between either taking an early action by committing a long-notice unit or favouring balancing supply with short-notice units. Therefore, there is limited opportunity of taking early actions and so a reduced concern about TSOs taking early actions. A move to non-zero LNAF and SIFF parameters in the scheduling tool would, at times, result in the optimisation tending to schedule more shorter notice units to provide energy and reserve. If the notification times pass for the longer notice units, these long-notice units would become unavailable for commitment in the scheduling tool. During transition periods from high wind to low wind, non-zero LNAF and SIFF would somewhat increase the risk to securing the system as the few available offline long-notice units would be run less, be in cooler heat states and thus less reliable to start when required. If particular abnormal events occur (i.e. tripping of a large unit), non-zero LNAF and SIFF would increase the reliance on the fewer short-notice units that are not already committed and increase risk of not meeting the demand requirements during the start-up periods of the long-notice units that are in cooler heat states, when they are called to replace the original tripped unit. This may lead to a potential system alert.

Area of Analysis		Summary of Findings resulting in the Recommended Values
2	Security of Supply: **Generation Reliability**	To manage the tight generation margins over the last year, similar to the previous year, there have been a number of transmission constraint groups (TCGs) put in place in the scheduling tool to improve the likelihood that generation is available during period of peak demand for conventional generation. • 'Security of Supply' constraints have been applied prevent the running of certain units to manage their run hours. As a consequence, other generators were run in their place. • Separately 'Security of Supply' constraints were applied to ensure that other units remained synchronised due to risk that they may not restart at a later stage to support the power system during periods of tight margins. These security of supply TCG's result in the scheduling optimisation tool keeping on long-notice units to ensure they continue to be available whilst scheduling off short-notice units to preserve their running. These interventions are more significant and direct than the intent of LNAF and SIFF. Non-zero LNAF and SIFF would not be an alternative to these interventions.
3	Security of Supply: **Interconnector Uncertainty after Day-Ahead**	Since the 31st December 2020, the day-ahead market does not include any GB-SEM interconnection capacity. As a result, the TSOs do not receive day ahead interconnector schedules for Moyle and EWIC. There is a risk that the intraday markets do not schedule an import to SEM at times of low generation margins. To mitigate this risk, the TSOs set the flows on the interconnectors to zero in the day ahead scheduling. This at times may result in scheduling the commitment of an additional long-notice unit. This decision is based on significant assumptions as a result of the lack of interconnector schedules at day ahead stage and security of supply concerns whereby there are few or no options to back up any interconnector flow that does not materialise. Such a necessary procedure has greater significance than what was envisaged during the design of the LNAF and SIFF parameters and overshow any application of non-zero LNAF SIFF.

Area of Analysis		Summary of Findings resulting in the Recommended Values
4	DS3 7 Sets Operational Trial	At present there is a system stability TCG in place that ensures there is at least 8 conventional units on-load, at any one time, on the island to manage dynamic stability (3 units in NI and 5 units in IE). In 2023, a trial is planned to reduce this TCG from 8 units to 7 units to continue to maximise renewables penetration. This trial is planned to continue until the end of 2023 with the expectation that it becomes enduring policy. The TCG will ensure seven units are on-load. However, in the event of renewable generation decreasing suddenly, an eighth conventional unit may need to be instructed to synchronise. If the LNAF and SIFF parameters are set to non-zero, the optimisation may delay scheduling the commitment of an eighth conventional unit and therefore there is an increased risk that the offline units to meet the demand would have longer notification times (as they will be colder) and would be slower and less reliable to balance demand. Moving to non-zero LNAF and SIFF would somewhat add to the risk posed by the trial of 7 large sets and lower inertia and therefore we would be reluctant to recommend such a move.
5	Scheduling & Dispatch Audit	The outcomes of each of the SEM scheduling and dispatch process audits have not noted a concern in relation to the TSOs' taking early actions and have not made recommendations related to a change from non-zero values of LNAF and SIFF.

Table 2: LNAF and SIFF key considerations.

We have also reviewed the notice times of units at present compared to 2018 following the go-live of I-SEM and the introduction of the LNAF and SIFF parameters. Although we have found no significant reduction in unit notice times in the last four years, we believe it is important to include this analysis in future LNAF and SIFF parameter reviews. If notice times of units reduce from 2018, the rationale for bringing in the LNAF and SIFF parameter is no longer as critical as the early action time is reduced with the reduction in notice times of units.

5 Parameter Recommendations - 2023

Based on the points outlined in Table 2 above the proposed values for the parameters used in the calculation of the LNAF and SIFF for the calendar year 2023 remain unchanged to those of 2022, and are set out in the table below.

Scheduling and Dispatch Policy Parameter	Recommended Value for 2023 (same as 2022)
LNAF	0
SIFF	0

Table 3: Recommended LNAF and SIFF values for the calendar year 2023.

Appendix A

If the LNAF and SIFF parameters are non-zero and enabled within the scheduling tool, the values are determined and effect the scheduling tool as outlined in the steps and example below.

<u>Step 1: Set Values for LNAF</u>

The values for LNAF are set per Notification Time interval in hours as shown in Table 4 and illustrated in Figure 1 below. This data is entered into the TSOs scheduling tool.

NT (hours)	LNAF
0.00	0.000
0.25	0.000
0.50	0.000
0.75	0.000
1.00	0.000
1.25	0.002
1.50	0.004
1.75	0.006
2.00	0.008
⋮	⋮
24.00	0.184

Table 4: LNAF values.

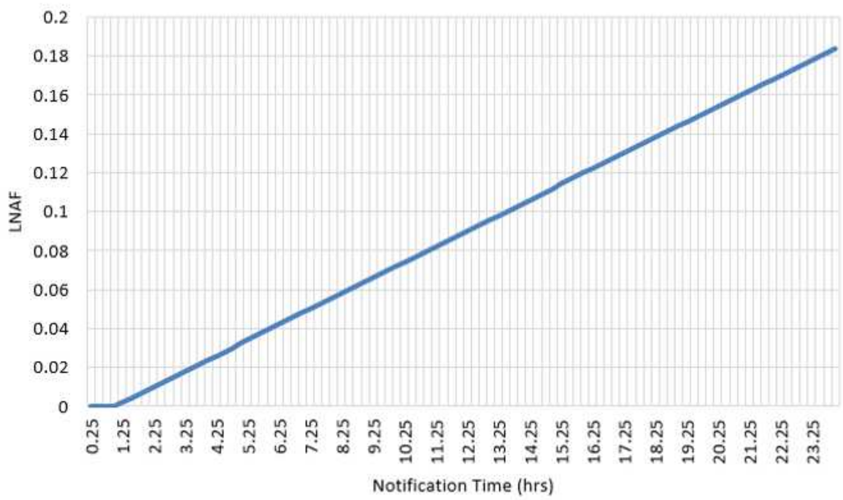

Figure 1: Graph for illustration purposes.

Each unit has an LNAF corresponding to the notifications time associated with each heat state as shown in Table 5 below.

Unit A Heat State	NT (hours)	LNAF
Hot	4.00	0.024
Warm	6.00	0.040
Cold	8.00	0.056

Table 5: Example of Unit A's LNAFs.

Step 2: Determination of SIFF

Once the Day Ahead Market results have been provided to the TSOs (13:30 day-ahead), if a shortfall exists, the SSII is calculated as the ratio of the total of any energy shortfall over the trading day (the sum of energy shortfalls in each period) divided by the total energy forecast for the trading day.

The SIFF corresponding to the calculated SSII, as shown in Table 6 and illustrated in Figure 2 below, is entered into the TSOs' scheduling tool.

SSII	SIFF
0.000	0
0.005	0.3
0.010	0.4
0.015	0.6
0.020	0.8
0.025	0.9
0.030	1.1
0.035	1.3
0.040	1.35
⋮	⋮
1.000	2

Table 6: SSI and SIFF mapped values.

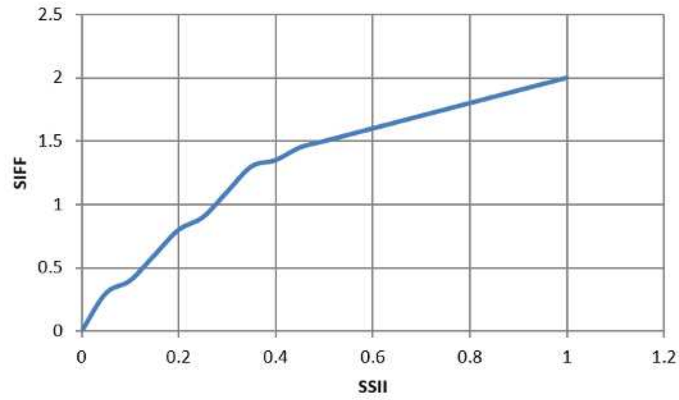

Figure 2: Graph for illustrative purposes.

Step 3: Determination of Start-Up Cost used in the Scheduling Tool

Following the determination of the LNAF and SIFF, the start-up costs for each heat state of each unit for application in any unit commitment run will be determined using the following formula:

*Start Up Costs in Scheduling Run = Submitted Start Up Cost * [1 + (LNAF * SIFF)]*

Example Calculation

The worked example in Table 7 below uses the LNAF and SIFF parameters outlined in Step 1 and 2 above and demonstrates how the LNAF and SIFF effects the scheduling process.

Display			
Calculated SSII	0.04		
Corresponding SIFF	1.35		
Heat State	Cold	Warm	Hot
Unit A Submitted Heat State Start Up Costs	12852	10710	8568
TOD Start Up Times	8	6	4
LNAF corresponding to TOD Start Up Times	0.056	0.040	0.024
SIFF	1.35	1.35	1.35
Calculated Start Up Cost for Unit A for each Heat State:	13823	11288	8845

Table 7: Calculated start-up cost for Unit A with LNAF and SIFF at non-zero.

The calculated start-up cost for Unit A for each heat state in Table 7 above is included in the scheduling tool optimisation. In the scenario where there is a system energy shortfall, the higher start-up cost for Unit A when it is offline in a cold state deters the TSOs optimisation tool from taking early commitment actions in the scheduling process and instead allowing more time for the ex-ante markets to resolve the energy supply/demand balance.