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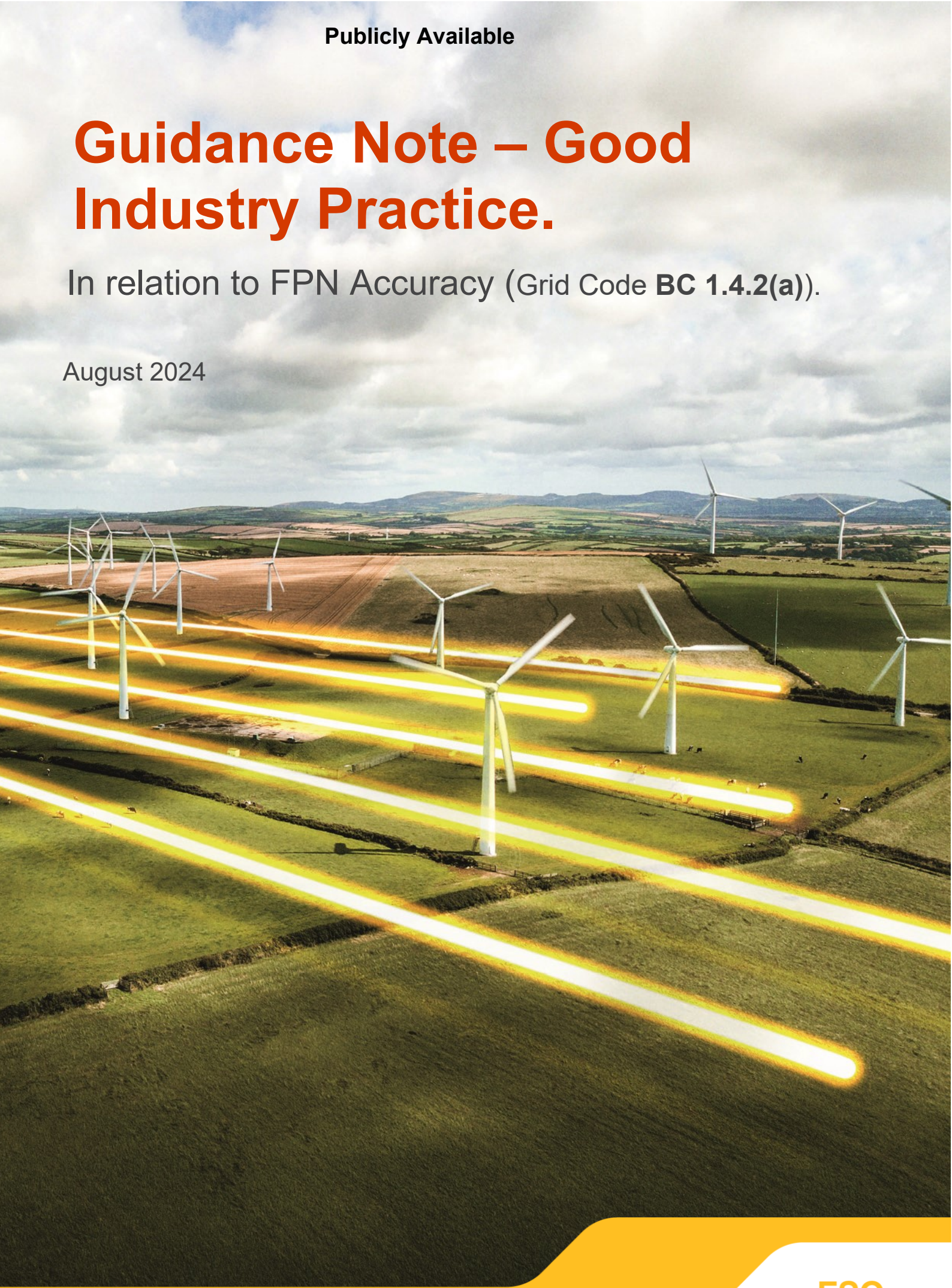
Guidance Note – Good Industry Practice.

In relation to FPN Accuracy (Grid Code **BC 1.4.2(a)**).

August 2024



ESO

Foreword

National Grid Electricity System Operator (ESO) has a licence obligation (C28 4(j)) to monitor balancing services markets. This Guidance Note is prepared to provide Balancing Mechanism Units (BMUs) and other market participants with a clear understanding of how the ESO monitors 'Good Industry Practice' in accordance with the Grid Code **BC 1.4.2(a)**. The purpose is to ensure transparency and provide guidance on how the ESO interprets these requirements. Wind BMUs on average exhibit greater inaccuracy of Final Physical Notifications (FPNs) than other fuel types and should take particular note of this Guidance Note. However, the monitoring process outlined in this document will also consider the accuracy of FPNs from all BMU fuel types.

This Guidance Note is also prepared for the assistance of prospective Generators that intend to connect directly to the National Electricity Transmission System and Embedded Power Stations that also wish to register as BMUs. In the event of dispute, the Grid Code and Bilateral Agreement documents will take precedence over these notes.

Definitions for the terminology used in this document can also be found in the Grid Code.

Following the release of the Draft Guidance Note, a three-week consultation period was conducted, during which 6 one-to-one calls were held and written feedback was received from 21 Market Participants regarding the threshold calculation methodology and the monitoring procedure outlined. This document represents the updates made following this consultation process, a complimentary document outlining changes made at a high level can be found online at: Consultation Summary.

The ESO's Market Monitoring team will be happy to provide clarification and assistance required in relation to these notes and on Grid Code compliance issues.

ESO welcomes additional feedback, and this can be directed to the ESO Market Monitoring Team at:

Market Monitoring Team, National Grid ESO

MarketReporting@nationalgrideso.com

St Catherines Lodge

Bearwood Road

Sindlesham

Nr Wokingham

Berkshire

RG41 5BN

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1. Introduction & Requirements

Grid Code **BC 1.4.2(a)** and **BC 2.5.1** outline the standard to which Final Physical Notifications (FPNs) should be prepared in accordance with Good Industry Practice. FPNs are an important parameter in the Balancing Mechanism, as the FPN should provide a true and accurate reflection of the MW import or export of a Balancing Mechanism Unit (BMU) for a particular half hour. This is vitally important for balancing as it gauges the difference between the contracted position struck between Generators and Suppliers and outlines to the ESO the BMU's intended schedule for export/import. The more accurate an FPN can be, the more accurate the indication of intended BMU export/import schedule, which, in turn will reduce errors and enable much more accurate procurement of bids and offers by the ESO in the balancing mechanism therefore keeping balancing costs down. Furthermore, Bid-Offer-Acceptance payments are based on deviations away from FPNs. Therefore, accurate FPNs will result in a reduction in Balancing Costs.

The ESO have identified significant inaccuracies in the provision of FPNs, which is leading to excess Balancing Costs being incurred and unnecessary operational risk in the balancing of Great Britain's electricity system. This Guidance Note outlines the accuracy to which ESO believe FPNs should be prepared. The need for BM participants to submit accurate FPNs has also been highlighted by the regulator, Ofgem, on a number of occasions.[1]

The level of accuracy in FPN submissions is stipulated in Grid Code **BC 1.4.2(a)**:

> *…**Physical Notifications** shall be prepared in accordance with **Good Industry Practice**.*

and in **BC 2.5.1** as

> *Each BM Participant must, applying Good Industry Practice, ensure that each of its BM Units follows the Physical Notification in respect of that BM Unit…*

Good Industry Practice is a defined term in the Grid Code as the following:

> ***Good Industry Practice**: The exercise of that degree of skill, diligence, prudence and foresight which would reasonably and ordinarily be expected from a skilled and experienced operator engaged in the same type of undertaking under the same or similar circumstances.*

This document serves to establish clear guidelines on the performance measures the ESO will use to consider whether 'Good Industry Practice' is being followed in relation to BC1.4.1(a) and BC2.5.1. While the term 'Good Industry Practice' allows for interpretation, it strongly emphasises the significance of skilled and experienced operators operating under comparable circumstances. This term is intended to enforce a high standard for operators in terms of their information submission and behaviour.

It is important to note that **this Guidance Note focuses on establishing thresholds for a level of accuracy which ESO considers to be within the bounds of Good Industry Practice for wind BMUs**. This is because Wind BMUs have been identified to be significantly more inaccurate than other fuel types and are causing more operational risks and excess Balancing Costs due to this inaccuracy and the prevalence of the requirement to curtail this particular fuel type. The ESO will continue to monitor the accuracy of other fuel types and will raise inaccuracy issues where necessary. Should other fuel types exhibit a similar level of inaccuracy and risk to operations, then the ESO will follow a similar process to establish Good Industry Practice for those units.

For the avoidance of doubt, it is expected that operators of all fuel sources should ensure their FPN submissions meet the principles of Good Industry Practice and that while present levels of inaccuracy in other fuel resources do not lead to a need to establish thresholds within this guidance note, the principles for the improvement processes outlined could be applied to an operator of any fuel source.

[1] See for example: https://www.ofgem.gov.uk/sites/default/files/2021-06/Open%20letter%20on%20dynamic%20parameters%20and%20other%20information%20submitted%20by%20generators%20in%20the%20Balancing%20Mechanism_0.pdf and https://www.ofgem.gov.uk/sites/default/files/docs/2016/12/scarcity_pricing_and_conduct_in_the_wholesale_energy_market.pdf

2. Objective

The ESO has established two threshold measurements that will be used, amongst other considerations, to assess 'Good Industry Practice'. It is important to note that these thresholds do not encompass all possible interpretations of what may be regarded as 'Good Industry Practice'. If, throughout the monitoring process it has been identified that there are extenuating circumstances leading to these thresholds not being met, the ESO will factor this into its decision to raise the inaccuracy to Ofgem.

This Guidance Note provides the following with regards to Good Industry Practice:

1. How the ESO has identified these thresholds.
2. How the ESO will continue to monitor the level of accuracy of FPNs; and
3. How BMUs can work with ESO to improve FPN accuracy and raise any specific concerns with meeting these thresholds.

3. Measuring Good Industry Practice in Relation to FPN Accuracy

This Guidance Note explicitly defines the level of accuracy that should be followed by wind BMU's to be considered by the ESO as operating within the bounds of Good Industry Practice for submitting Final Physical Notifications (FPNs). It will also allow the ESO to monitor, in a transparent manner, which units are improving the accuracy of their FPN submissions. We will work collaboratively with market participants to improve their level of accuracy and in cases where thresholds are not met, we will continue to engage with market participants and, if necessary, notify Ofgem should we have outstanding concerns that Good Industry Practice is not being followed.

In our establishment of a level of accuracy that the ESO will use to assess whether Good Industry Practice has been followed, we have considered the following:

1. What would provide a significant improvement to operational risk and reduce balancing costs?
2. What would the BMUs be capable of achieving?
3. How should this threshold be adjusted in the future?

The ESO is therefore providing guidance in relation to two measures that it will use to assess Good Industry Practice regarding FPN accuracy, which are the following:

A) The net error between FPN and Actual Metered Output of a BMU should be **between 2.6% and -2.6% for each month** as a function of their available capacity; and

B) The sum of absolute error between FPNs and Actual Metered Output relative to total generation across a month should **be below 9%** as a function of their available capacity.

Measures provided for net errors are required to ensure that providers are correctly compensated for any bid offer acceptance volume as calculated from the Final Physical Notification. Measures provided for absolute errors are required to minimise operational risk by increasing the certainty on output.

All the measures described in this guidance note relate to the Final Physical Notification. It is important that Pre-gate Closure Physical Notifications should also reflect a unit's best expectation of output, but it is recognised that both commercial and weather factors lead to changes in output that make it inappropriate to stipulate a percentage accuracy relative to delivered volume.

4. Methodology

In establishing how the ESO interprets good industry practice we have identified two measures as important, absolute error which is a representation of the cumulative errors over time and net error which is a representation of any directional offset in the errors leading to persistent under or over statement of the expected output of the unit based on submitted data. A high standard of performance against both metrics is required to minimise costs associated with uncertainty and to ensure fair settlement of bid offer acceptances, which are paid based on calculations from the physical notification and therefore affected by any directional error bias.

In line with received feedback, the methodology has been adapted to one based on the available capacity of the unit rather than the delivered output of the unit as the denominator. This results in a methodology as follows for the calculation of error:

Threshold 1 – Net % Error

$$NET\_PERC\_ERROR(u,m) = \frac{NET\_ERROR(u,m)}{\sum_{s \in S(m)} CAP(u,s)}$$

$$NET\_ERROR(u,m) = \sum_{s \in S(m)} FPN(u,s) - AMO(u,s)$$

In each settlement period the expected energy delivered minus the metered output is calculated. This parameter is then summed across the duration of a month to provide a monthly net energy error. Directionality is maintained so positive errors offset negative errors and the monthly value is a cumulative value across the monthly sample period. To turn this into a percentage, the sum of each settlement period capacity is used as the denominator, where capacity is assumed as the minimum of the average Maximum Export Limit declared in any period or the registered capacity of the unit.

Threshold 2 – Absolute % Error

$$ABS\_PERC\_ERROR(u,m) = \frac{ABS\_ERROR(u,m)}{\sum_{s \in S(m)} CAP(u,s)}$$

$$ABS\_ERROR(u,m) = \sum_{s \in S(m)} |FPN(u,s) - AMO(u,s)|$$

In each settlement period the expected energy delivered minus the metered output is calculated and the absolute value is calculated. This parameter is then summed across the duration of a month to provide a monthly absolute energy error. Directionality is lost so positive errors and negative errors in each settlement period are cumulative across the monthly sample period. To turn this into a percentage, the sum of each settlement period capacity is used as the denominator where capacity is assumed as the minimum of the average Maximum Export Limit declared in any period or the registered capacity of the unit.

Variable	Units	Description
NET_PERC_ERROR(u,m)	%	The net percentage error measurement.
ABS_PERC_ERROR(u,m)	%	The absolute percentage error measurement.
AMO(u,s)	MWh	The actual metered output according to settlement metering.
CAP(u,s)	MWh	Minimum of the MEL or the capacity of the unit in each settlement period.
FPN(u,s)	MWh	The expected metered output according to Physical Notifications. *(Periods affected by a Bid/Offer*

		acceptance or an unavailability as indicated by a Maximum Export Limit below the Physical Notification adjusts this Expected Output parameter according to wider Grid Code).
NET_ERROR(u,m)	MWh	The net error MWh of error between FPN and AMO.
ABS_ ERROR(u,m)	MWh	The absolute MWh of error between FPN and AMO.
u	BMU_ID	Balancing Mechanism Unit.
m	Month	The month in which the NET_PERC_ERROR and ABS_AVG_ERROR is being calculated for.
s	Settlement Period	Settlement Periods.
S(m)	{}	Set of Settlement Periods in month m that exclude Settlement Periods where a Bid/Offer acceptance or unavailability as indicated by a Maximum Export Limit below the Final Physical Notification adjust this Expected Output parameter in accordance with wider Grid Code.

Table 1: Variables and their descriptions for calculating the Accuracy Thresholds.

All figures are collected using Elexon data to ensure complete transparency and repeatability of approach. Periodically the datasets used in analysis will be updated and published on the ESO balancing costs page.

Threshold Calculation

In line with received feedback, consistent performance across a full year is used in setting the thresholds. Data from the duration of 2023 was used with the monthly values for every wind BMU calculated using the respective outlined formula. To ensure measures were possible to achieve consistently, each BMU's **maximum error** in each category was calculated. The top 10% of units by this measure were then used to set the respective error thresholds that inform the ESO's view of Good Industry Practice.

Performance of the Top %	Net % Threshold	Absolute % Threshold
25%	±3.74%	9.93%
20%	±3.32%	9.59%
10%	±2.60%	8.92%
5%	±1.86%	8.29%
ESO view of Good Industry Practice Threshold	±2.6%	9.0%

Considering absolute errors, 47% of units in the top performing 10th Percentile were offshore windfarms and 53% were onshore windfarms. The smallest unit was 32MW and the largest unit was 440MW. Using the same measure for net errors, 42% were offshore windfarms and 58% were

onshore windfarms. The range of unit sizes were from 32MW to 329MW. This leads the ESO to believe that the sample is broadly representative of the population of windfarms and while the methodology acknowledges that there may be reasons individual units cannot consistently achieve outlined levels of performance, the methodology used to set these benchmarks does not appear to strongly bias a class or size of wind generating asset.

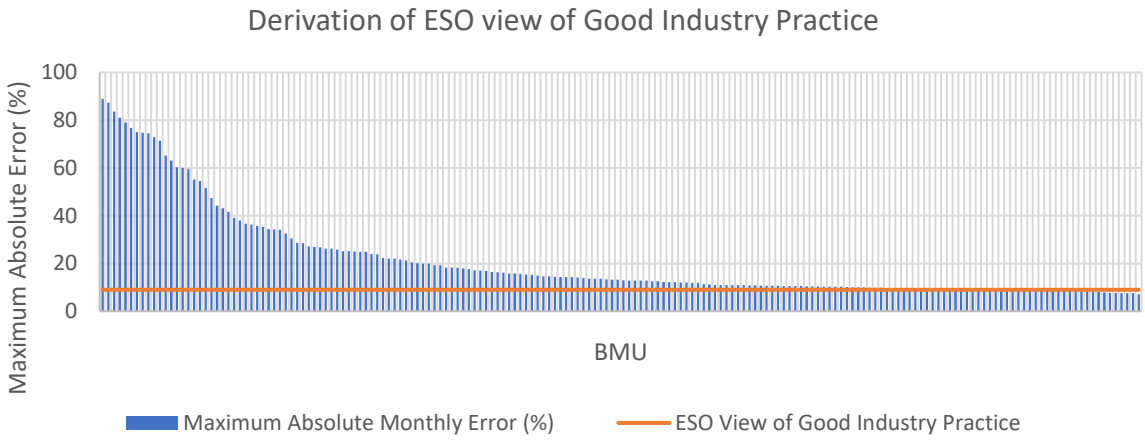


Figure 1: Illustration of absolute error methodology used in analysis. Note units with above 100% error are excluded for purposes of visualisation.

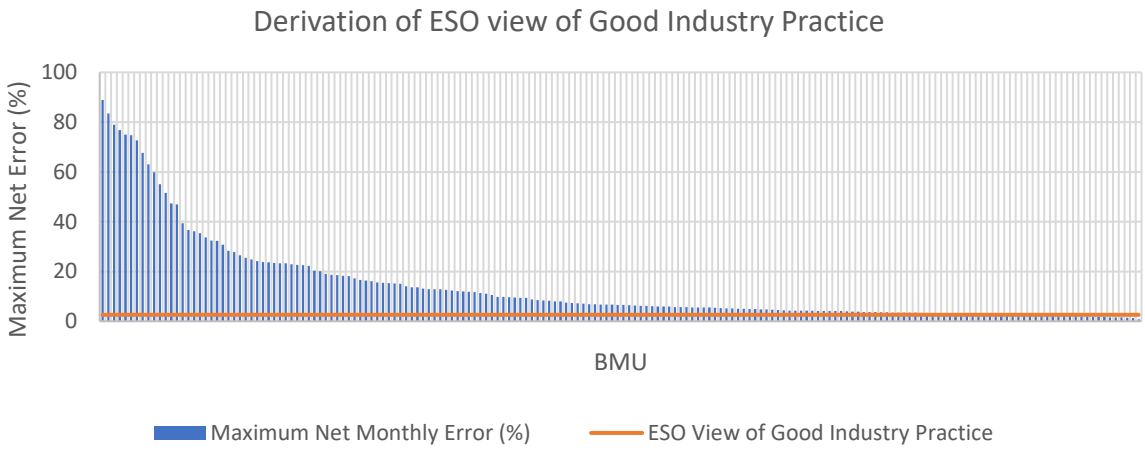


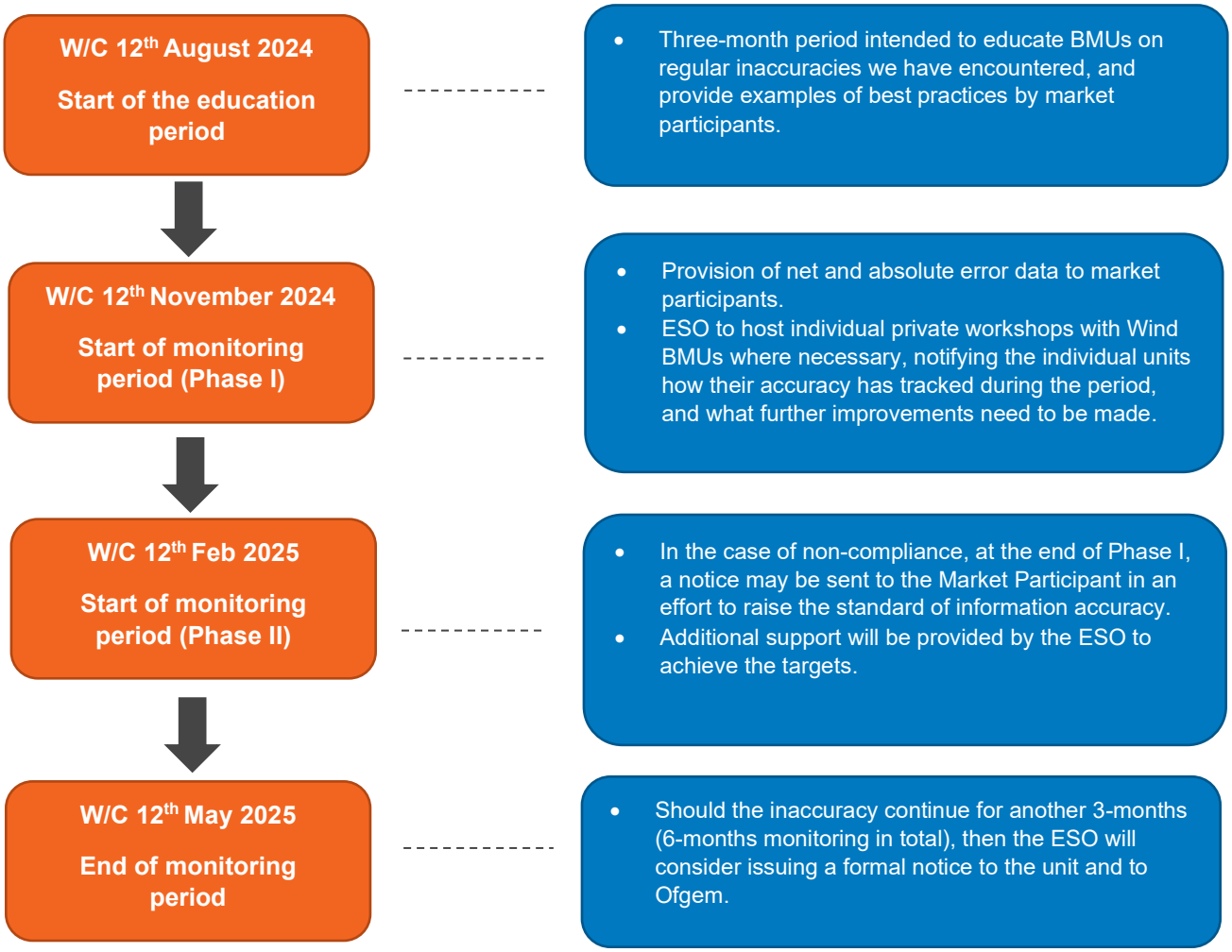
Figure 2: Illustration of net error methodology used in analysis. To accurately rank net errors and provide percentiles the absolute of directional value for the month is used to treat under and over statement of output consistently. This is illustrated rather than showing the directional data to be clear on the methodology used. Note units with above 100% error are excluded for purposes of visualisation.

In addition, when considering if these thresholds are achievable, when looking at the best performing months for each BMU, the measures proposed are achieved by more than 70% of wind generators meaning most units have demonstrated technical capability to meet these levels on occasion in 2023.

The monitoring process outlined below aims to foster collaboration and assist Balancing Mechanism Units (BMUs) in reaching the thresholds of Good Industry Practice. It is important to note that these thresholds do not encompass every aspect of what may be considered Good Industry Practice.

The ESO recognises that the monitoring process may uncover extenuating circumstances for certain wind farms that prevent them from meeting the defined thresholds. This understanding will be achieved through a collaborative process, involving close engagement with these wind farms to gain insights into the unique characteristics of their site(s). The ESO will consider these circumstances when determining whether to report any inaccuracies to Ofgem.

5. Education and Monitoring Procedure



The Monitoring Procedure is a six-month monitoring period for all wind BMU's with workshops and a gradual escalation of severity raised from continued inaccuracy. At the 3-month mark, a **notice** will be given to units that are not meeting these thresholds and that the ESO is intending to raise concerns to Ofgem that in ESOs view, Good Industry Practice has not been followed should this continue. Should the inaccuracy continue for another 3-months (6-months monitoring in total), then the ESO will consider issuing a **formal notice** to the unit and to Ofgem that the expected level of accuracy has not been followed for each BMU not meeting these thresholds. Following these six-months, to ensure the continued accuracy of FPNs, the last three months of the outlined Monitoring Procedure will continue to roll-over, with the ESO remaining collaborative and working with the BMUs to improve their FPNs throughout.

It is expected that newly connected BMUs are likely to exhibit more inaccurate FPNs. So, should a new Wind BMU connect to the network, then this particular BMU will begin at the start of this six-month Monitoring Procedure to allow more time to improve their FPNs should it be required.

At the start of the Monitoring Procedure, the ESO will contact each Wind BMU with their NET_PERC_ERROR(u,m) and ABS_PERC_ERROR(u,m) values for the last 6-months, to indicate how their accuracy has been over that period. This will be followed by a 3-month education period, which will include what we have encountered as regular inaccuracies and encourage sharing of best practice among Wind BMUs. The aim of this education period will be to collaborate with industry in resolving their information inaccuracies, but to also ensure that BMUs are made aware of avenues for improvement.

Following the commencement of the Monitoring Procedure, the ESO will monitor the accuracy of Wind BMU's FPNs to ensure improvements are being captured and further inaccuracy can be resolved. During these first three-months, the ESO will be hosting individual private workshops with Wind BMUs where necessary, notifying the individual units how their accuracy has tracked during that period, and what further improvements need to be made before they may be considered operating within the ESO's view of Good Industry Practice. At the end of this initial three-month period, should Wind BMUs continue to operate outside of the ESO's view of Good Industry Practice as defined in this guidance, then a notice may be sent to the Market Participant informing them that their efforts to improve information inaccuracy have not been acceptable and that the next stage of the escalation process is being triggered.

The second three months of the Monitoring Procedure will see a continued monitoring period, which provides a final opportunity for the unit to improve their information accuracy. The ESO will continue to host workshops with Wind BMUs not meeting the Good Industry Practice thresholds. During the monitoring process should there be any clear remediations outlined, extenuating circumstances identified, or conditions agreed that would justify reasons for not meeting these thresholds, these will be considered in any escalation decision.

Across the process, we will make reasonable allowances for exceptional circumstances and specific process or system reasons that thresholds may not be met. Where improvements or plans for improvements are indicated to ESO as part of the ongoing workshops this will be considered and if appropriate also relayed to Ofgem in any escalation process or used as a mitigating reason not to escalate.

6. Feedback & Correspondence

The ESO will provide updates and initial notifications regarding workshops and the Monitoring Procedure at the Operational Transparency Forum and via the ESO's Balancing Cost website. Private correspondence on Wind BMU performance of FPNs will be made via email and Microsoft Teams conference calls to individual BMUs.

Should any parties wish to provide feedback on the outlined thresholds and Monitoring Procedure in this Guidance Note, we ask that it is submitted via email to MarketReporting@nationalgrideso.com