Power Park Module Signal Best Practice Guide

for Intermittent Generation

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Overview

Introduction

This Power Park Module (PPM) guidance note is aimed at intermittent generators in the Balancing Mechanism submitting operational data to National Grid Electricity System Operator (ESO) Control. It intends to explain current control room operations in relation to intermittent generation and provide clarity of best practice for submitting operational data. It is important that agreed best practice evolves as industry understanding develops and as such, the content of this document may be reviewed to appropriately reflect such developments.

National Grid ESO is actively trying to improve the efficient use of intermittent generation to balance the system, with a focus on using the Power Available (PA) signal to enable accurate use of services such as Frequency Response. Further benefits of PA such as improved forecasting accuracy could also open more opportunities for intermittent generation to participate in response and other reserve services.

The information explained in this document is derived from the Grid Code. Please note this is an attempt to clarify understanding and promote discussion and actions to enable the benefits of proposed changes faster. <u>The Grid Code remains, as always, the authoritative document in case of any contradictions.</u>

The purpose of this document is to explain the process of how National Grid ESO balance the system and how power park modules should effectively participate in this. The document explores the process National Grid ESO follows to commit resources and balance the system, the data required of intermittent generation and how a Power Park Module should behave practically in various scenarios.

Definitions are included in Appendix A.

The document is structured by first introducing the data that is required to be provided by Power Park Modules to National Grid ESO in Section 2, before explaining in detail how this should practically be submitted under different operating conditions in section 3.

Drivers for Change

As the amount of intermittent generation on the system increases and thermal plant that was traditionally relied on for energy balancing and response declines, there is an increasing need to procure balancing services from new sources. National Grid ESO is not able to fully utilise intermittent generators to provide response or other reserve services without accurate Power Available (PA) signals. Power Park Modules with connection agreements after April 2016 are required to provide PA signals under the Grid Code, however the ESO is only receiving accurate data from a handful of generators. This creates a challenge for the Control Room as they are required to take actions to balance the system and with incorrect data, the wrong actions could be taken. This leads to a lack of confidence when instructing generators which contributes to Power Park Modules not being instructed to participate in balancing markets.

National Grid ESO Control Operations

This section explains the two key stages of balancing the network that take place between day ahead and real-time time scales. These are Resource Commitment and Resource Balancing.

Balancing the System from Day Ahead to Real-Time

For the effective operation of the electricity control room, accurate data is required. Effective operation means balancing supply and demand securely using the most cost effective methods possible.

Inaccurate data leads to sub economic operation and puts the electricity system at greater risk. These risks include overloading parts of the network or creating situations where the requirement for energy reserves or system security requirements such as frequency response are not met.

As National Grid ESO must ensure secure operation, two main activities take place within day: Resource Commitment and Resource Balancing. Firstly, the ESO forecasts the total Generation Requirement (referred to as Demand) and procures additional resources to meet the forecast Demand as well as the Security and Reserve requirements during the Resource Commitment phase. This ensures compliance with the Security and Quality of Supply Standard (SQSS). The committed resources are instructed to change output or enact services such as Frequency Response during the Resource Balancing stage to ensure “Demand” is met and the system is secure.

Resource Commitment Process

Resource Commitment is the process whereby National Grid ESO calculates which generators, controllable demand and ancillary services to commit to the system. Ancillary services include Frequency Response and Intertrip schemes for generators/demand or circuits on the network. The Balancing Mechanism (BM) Gate is a period up to 90 minutes from real time, where trading related data cannot be changed. The BM Gate “freezes“ data submitted to the ESO, allowing time for the control room to calculate any necessary adjustments and execute actions. Resource commitment can take place within the BM Gate and outside the BM Gate such as warming instructions or future trading.

Resource Balancing Process

Resource Balancing ensures the ESO has enough capacity on the system to meet demand and security requirements such as Frequency Response. Within the BM Gate closure period no data can be submitted or changed by external parties to ensure the ESO has enough time to instruct generation to increase/decrease and keep the system frequency within operational limits of the 50Hz target. Note, data related to technical issues such as SEL/MEL/Ramp Rates can still be resubmitted within the BM Gate as it is essential for the ESO to know if a unit is going to change MW output onto the system due to a technical or safety reason.

The Balancing Mechanism

The Balancing Mechanism operates from BM Gate Closure through to real time and is managed by National Grid ESO. The BM Gate time period from real time is 60 minutes to

90 minutes on a rolling basis to ensure at least a 60-minute period of fixed market data at all times. An example of this is at 10:00 the BM Gate is at 11:30 meaning market related data cannot be changed between 10:00 and 11:30. At 10:29 the BM Gate is still at 11:30. At 10:30 the BM Gate moves to 12:00 and so on.

The BM exists to ensure that supply and demand can be continuously matched or "balanced" in real time. As the market moves towards the final balancing stage it is important to be able to assess the physical position of market participants to ensure security of supply is maintained effectively and efficiently.

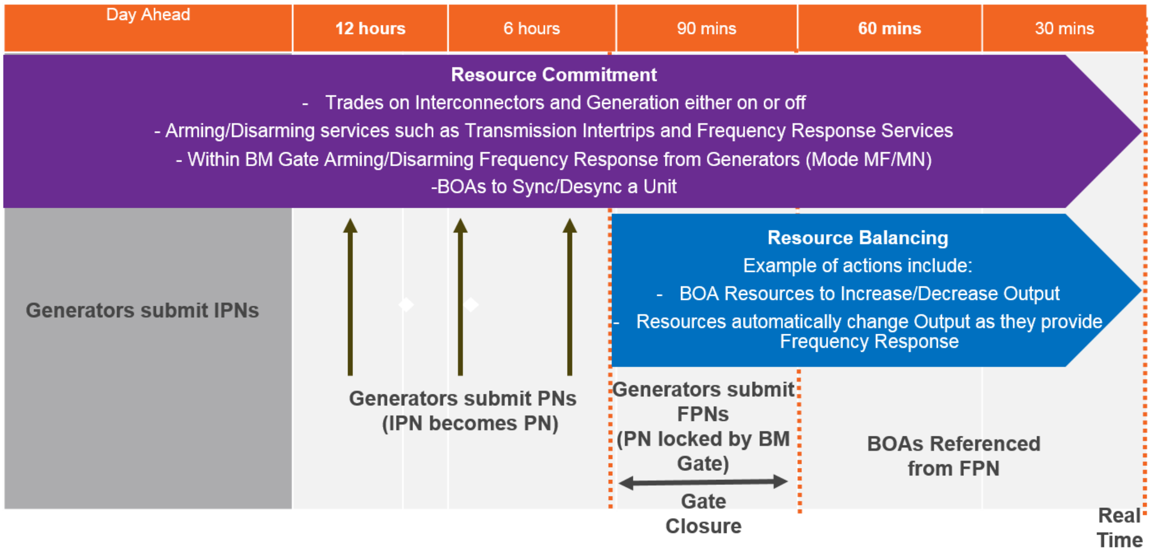
To this end, all market participants are required to inform the ESO of their intended physical output position. Initial Physical Notifications (IPNs) are submitted at 11:00am at the day ahead stage. These are continually updated until Gate Closure when they become the Final Physical Notifications (FPNs). Market participants are also required to indicate the operational Maximum Export Limit (MEL) of their unit during each settlement period. The summation of these notifications, along with estimates of demand forecasts and other relevant information, inform the ESO as to any likely subsequent activity that the ESO will need to enact to maintain the demand /supply equilibrium.

National Grid ESO is the instigator and sole counter party to all transactions that take place in the Balancing Mechanism. Participation, which is optional, involves participants submitting 'offers' (proposed trades to increase generation or decrease demand) and/or 'bids' (proposed trades to decrease generation or increase demand). The prices and volumes of each of these submissions indicate the value that participants have placed on moving from their Final Physical Notification (FPN) declared at Gate Closure. The instruction to move a participant from one position to another must conform to the dynamic characteristics of the BM Unit as declared by the party at gate closure. The ESO is obligated to accept these bids and offers in an economic and efficient manner and compensation for participants is on a pay as bid basis.

To summarise, the wholesale market is based on trades between generators/demand and suppliers. This market is design to self-balance and enables energy to be traded on a contractual basis. However, the resulting market position will not truly reflect the actual generation or demand position at any one time and it is National Grid as ESO who will use bids and offers from market participants to fine tune the generation and demand profiles such that they are balanced at real-time.

Figure 1 shows Resource Commitment and Balancing from Day Ahead to Real-Time.

Figure 1: Resource Commitment and Resource Balancing



2

Data Requirements for Power Park Modules

Data Requirements Summary

This section is a summary for Power Park Module operators, explaining what data is required by National Grid ESO to enable optimal utilisation of Intermittent Generation.

Below are the data sets required from PPMs that this best practice guide will focus on. These signals dictate the control room's actions when balancing. All units are in MWs.

BM data submissions	
Maximum Export Level (MEL)	The sum of the maximum operational output of all Power Park Units in service over time, excluding weather effects. *(The MEL definition for PPMs was modified by GC0063 and is different to other types of generation)*
Stable Export Level (SEL)	The lowest level of generation possible without de-sync. *(Most modern wind farms can operate with turbines synchronised with zero power output)*
Physical Notification (PN)	The most accurate forecast of MW output at Grid Entry Point Meter.
Operational metering signals	
Power Available (PA)	The MW output the Power Park Module could generate at the Grid Entry Point Meter if National Grid ESO instructed it to operate at full output based on the renewable energy source available at that time. This signal should be consistent with the MW value at Grid Entry Point Meter, unless output is altered by an instruction or by providing a service such as Frequency Response. Signals to have a 1 second update rate or better (for further information on the refresh rate requirements please see the Power Available Data Specification Tables in Section 3)
Metered Output (MO)	The active power (MW) output fed onto the system and measured at the Grid Entry Point. Signals to have a 1 second update rate or better.

The information below is also submitted to National Grid ESO by all generators. It is also important for control room operations but will be focused on less in this document.

Other Operational metering signals	
Strength and direction of non-controllable power source (applies	For wind generators, this is wind speed and wind direction in m/s and degrees from North in a clockwise direction. The detail of these parameters will vary for other technology types such as solar and

to intermittent generation)	tidal to reflect the relevant power source. Signals to have a 5 second update rate or better.
MVAr power output derived from settlement metering	This is the reactive power (Mvars) fed onto the system. Signals to have a 1 second update rate or better.
Voltage (kV)	Voltage metering derived from user's voltage transformer. Signals to have a 1 second update rate or better.
Frequency (Hz)	Frequency signal derived from user's plant. Signals to have a 1 second update rate or better.
Other Generator parameters used for system balancing	
Notice to Deviate from Zero, NDZ	Should be the shortest possible time in minutes it would take the Power Park Module to start generating from a shutdown *(typically 2 minutes).*
Minimum Non-Zero Time, MNZT	Should be the shortest possible time in minutes the Power Park Module can generate before reducing output back to zero *(typically 2 minutes).*
Minimum Zero Time, MZT	Should be the shortest possible time the Power Park Module can generate zero MWs before increasing generation again *(typically 2 minutes).*

This list provides a high-level summary and is not exhaustive – please refer to the link below for the EU onshore generation template – (Appendix F5 - Schedule 2) which provides more detail.
https://www.nationalgrideso.com/sites/eso/files/documents/Examples%20of%20Generic%20BCA%27s%20v1.pdf

The requirements for Power Available were introduced under Grid Code Modification GC0063. Full details of this workgroup are detailed in the Report to Authority, which is available from the following link:
https://www.nationalgrideso.com/document/13431/download

Why is Power Available Necessary?

National Grid ESO Control Room use the data supplied by generators to actively balance the system. The PA signal gives the real-time MW export capability of intermittent generation when they respond to frequency response or under instruction from National Grid ESO to de-load. During these periods the Control Room operators use PA data to calculate headroom available to them, on which they will make decisions on the most effective instructions to issue to the market. Without the PA signal, actual MWs available to upload from intermittent generation are not available. In practical terms this means NG ESO does not know:

1- what positive reserves are available which affects plant commitments
2- how much frequency response can be delivered by each unit which affects response allocation
3- what data to feed the NG ESO wind forecast system when units are de-loaded which affects forecast accuracy and
4- the very near term forecast for the next few hours of units de-loaded is not accurate enough to determine return MW at the end of de-load instructions. This creates issues around balancing the System frequency and affects the accuracy of cost optimisation across the system. It also negatively impacts the utilisation of the Wind units as services from Wind Units are not utilised to their full potential which effects revenue for the providers.

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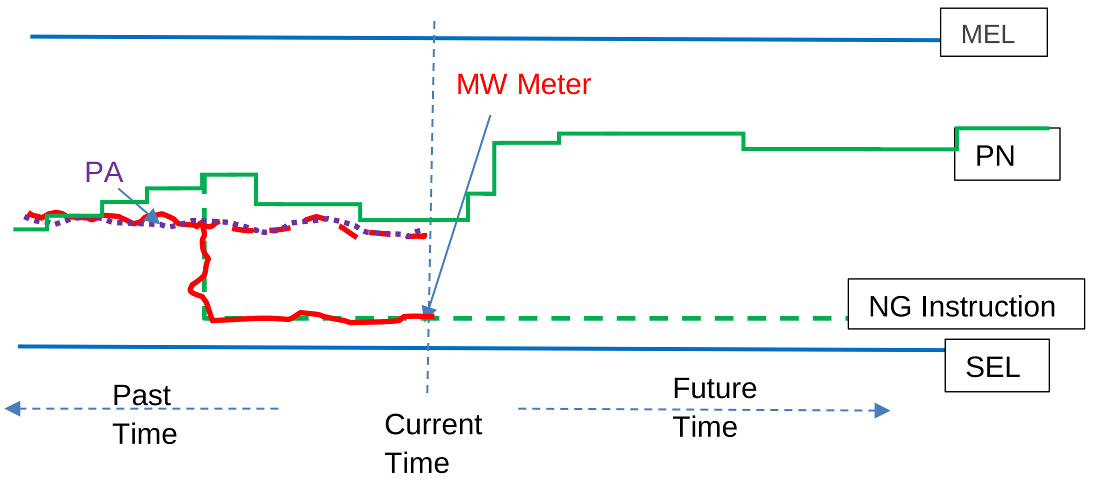
Operational Best Practice for Intermittent Generation

Operational Data Guide

This section details further the information presented in Section 2. The data discussed in this section are PN, MEL, SEL and PA

Figure 2 shows the data required for a wind unit to be effectively utilised by National Grid ESO.

Figure 2 Data Related to a Power Park Module



PN – Physical Notifications

For each BM Unit, the Physical Notification is a series of MW figures and associated times, making up a profile of intended input or output of Active Power at the Grid Entry Point or Grid Supply Point, as appropriate.

This is, for Intermittent Generators, a forecast of what the actual MW output at the Grid Entry Point will be, considering weather and individual turbine and plant availability. PN data should be submitted at 1 minute granularity to reflect forecast Active Power output from PPMs. Averaging data across each settlement period should be avoided as it results in control system step-changes. ESO control room systems graphically display this data as seen in Figure 2.

It is crucial that this PN data is accurate as all instructions and services are costed from PN.

The PN data can be resubmitted at any time but cannot be changed within the BM Gate time window. All National Grid ESO Instructions (also known as BOAs) start from and finish at the PN. The cost of this volume is then paid to the relevant units.

Maximum Export Limit (MEL)

The definition of MEL for PPMs was modified by GC0063 and is different to other types of generation. The for Intermittent Generation, MEL is simply the maximum MW output that would have been delivered onto the Grid if the variable fuel source was optimal for generation. Any technical limitations and power park units out of service should be considered and the MEL reduced accordingly.

The Grid Code definition of MEL is described in Grid Code section BC1.A.1.3.1 and also included in Appendix A. A summarised definition of MEL is the registered capacity of a Power Park Module less the unavailable Power Park Units.

MEL should be readjusted as conditions change in real time to reflect plant availability, such as Power Park Units being taken out of service for operational or maintenance reasons.

Note: For Frequency Response effectiveness, it is important to know how many turbines are in service. Currently National Grid ESO use the MEL to estimate number of turbines in service.

Stable Export Limit (SEL)

The SEL of an Intermittent Generator is the same for conventional generation and is simply the lowest MW Output at which the unit can generate in a stable condition without having to reduce MW output to zero.

Stable Export Limit (SEL) expressed in MW at the Grid Entry Point or Grid Supply Point or GSP Group, as appropriate, being the minimum value at which the BM Unit can, under stable conditions, export to the National Electricity Transmission System. Data submitted at 1 minute granularity.

Power Available (PA)

Power Available is defined in the Grid Code Glossary and Definitions but in summary is: the real-time potential MW output that a Power Park Module could generate allowing for current weather conditions and available Power Park Units. It is required by the National Grid ESO Control Room to balance the system using generation from intermittent generators such as Wind, Solar, and Wave.

Providing the ESO with Power Available data is part of the operational metering requirements for Power Park Modules. It is additional to the data requirements mentioned above and should be sent continuously to the ESO as an analogue signal via the SCADA communication link.

Power Available Data Specification:

Constraints	Note
PA data must have a 1 second update rate or better	As part of the operational metering requirements, PA must be sent continuously to the ESO as an analogue signal via the SCADA communication link. To align with Operational Metering refresh requirements and best practice the long term aim is to achieve a PA signal with a 1 second refresh rate. The requirement for a

	PA signal and the associated refresh rate is currently specified in Schedule 2 of Appendix F5. For all new sites a 1 second refresh rate is specified in the standard F5 template and we are confident that the latest equipment is capable of achieving this. Some existing sites are equipped with older equipment that may be incapable of measuring accurately at the required 1 second interval. There is no intention from NGESO to update the existing bilateral contracts to mandate a 1 second refresh rate on these existing sites at present. It should, however, be noted by market participants that a 1 second refresh rate of an accurate PA signal is much preferred by control room operations as this data will be used in the decisions taken to support system balancing.
PA must be precise to the nearest MW or better.	Small PPMs <50MW may benefit from providing PA to 2 decimal places
A PA Status signal should also be sent alongside the PA MW value advising if the PA data is “OK” or “Unreliable”.	If the PPM is aware that the PA data may be unreliable for whatever reason, then the status should be reflected accordingly.
PA must be equal to Metered Output unless the PPM is constrained (within the agreed tolerance)*	Unless output is constrained by an ESO instruction such as a BOA or by providing a service such as Frequency Response, PA should be the same as the MW value at the Grid Entry Point Meter (Metered Output) as all available power is being generated.
PA must be less than or equal to MEL (within the agreed tolerance)*.	PA should never exceed the value of MEL as this would indicate that more power is available than the maximum that can be generated under optimum weather conditions. This applies if MEL is submitted correctly. However, the MEL should not cap the PA calculated value. This is to prevent inaccurate MEL making PA inaccurate.

***All Power Available signals must be accurate; however, an agreed tolerance / acceptable error will be defined in the Power Available Quality Standard which is currently in development. The expected publication date of this document is March 2020. Once the Power Available Quality Standard is published this Best Practice Guide will be updated to reflect the agreed tolerance.**

Intermittent Generation Behaviour

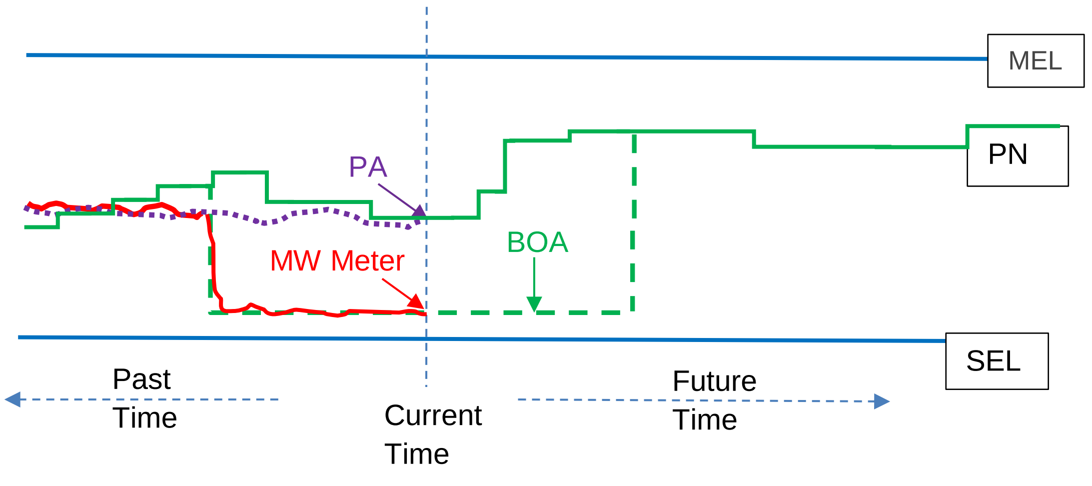
Behaviour During BOA

During the BOA period the Power Park Module must follow the new CCL (PN changed by MEL or BOA =Capped Committed Level) as created by the BOA instruction. Meaning the MW Meter output will reduce to follow the BOA target.

Additionally, during the BOA period the PA MW values sent to National Grid ESO must remain the calculated potential output and be recalculated continually. For clarity, this PA MW value should be the MW the Power Park Module would be generating if it was not deloaded to follow the BOA.

Deloading should be done by reducing output evenly across all turbines to maintain predicted response capability unless a different approach was approved and used during connection testing to derive the MSA response tables.

Figure 3: PA behaviour during BOA

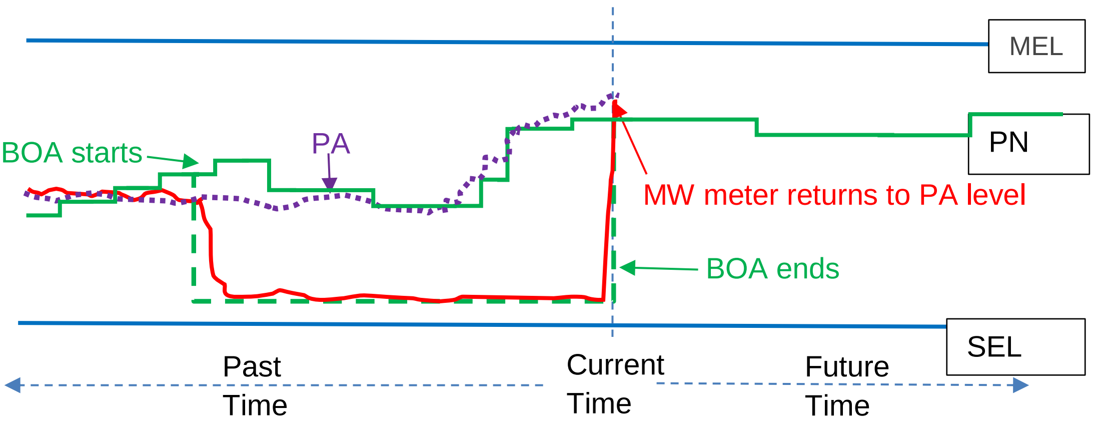


PA - The MW output that would be delivered if the Power Park Module was not instructed to deload

Behaviour at the end of a BOA

To control the national system frequency, the imbalance between generation and demand cannot exceed 300MW. It is therefore very important that the Power Park Modules return to full output at the exact minute the BOA instruction ends. Currently many existing Power Park Modules have a manual process to set the set points of the modules to follow the instruction and, as such, the return time is not always at the end of the BOA as expected.

Figure 4: PA behaviour at the end of BOA



The MW output returns quickly to the PA level after the BOA ends

Behaviour During Frequency Response

All Generating Units subject to the EU Code including Power Park Modules are required to operate in Limited Frequency Sensitive Mode unless instructed to Frequency Sensitive Mode (i.e. free governor action). When the National Grid ESO requires further frequency response, additional Generating Units will be instructed to Frequency Sensitive Mode by receiving a 'code MF' instruction (Note different contracts can have different codes such as MFA,MFD etc). The 'code MF' instruction is sent to trigger mandatory frequency response and commercial response for balancing mechanism units, BMUs.

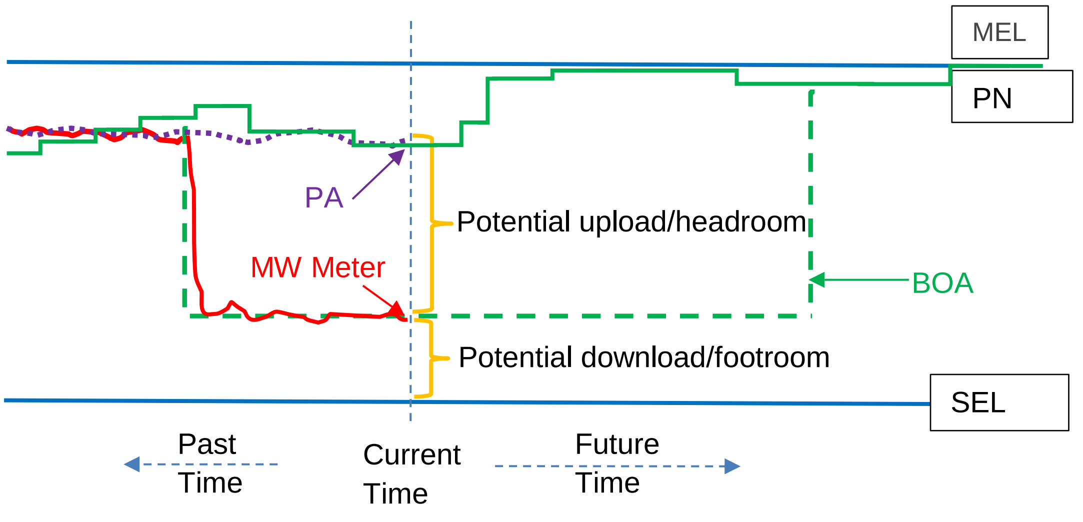
During operation in Frequency Sensitive Mode, the Power Park Module must change output in relation to system frequency, reflecting the frequency response capability curves as tested and included in the Mandatory Services Agreement.

If the National frequency is higher than 50Hz the Power Park Module will deload. The reverse is true: if the National frequency is lower than 50Hz the unit will increase output.

Note: the Power Park Module will only upload if it was not at full output (PA) before the National frequency fell below 50Hz.

At all times the PA MW value should remain what the Power Park Module would be generating if it was at full output, not following a BOA instruction or providing frequency response.

Figure 5: PA behaviour during Frequency Response



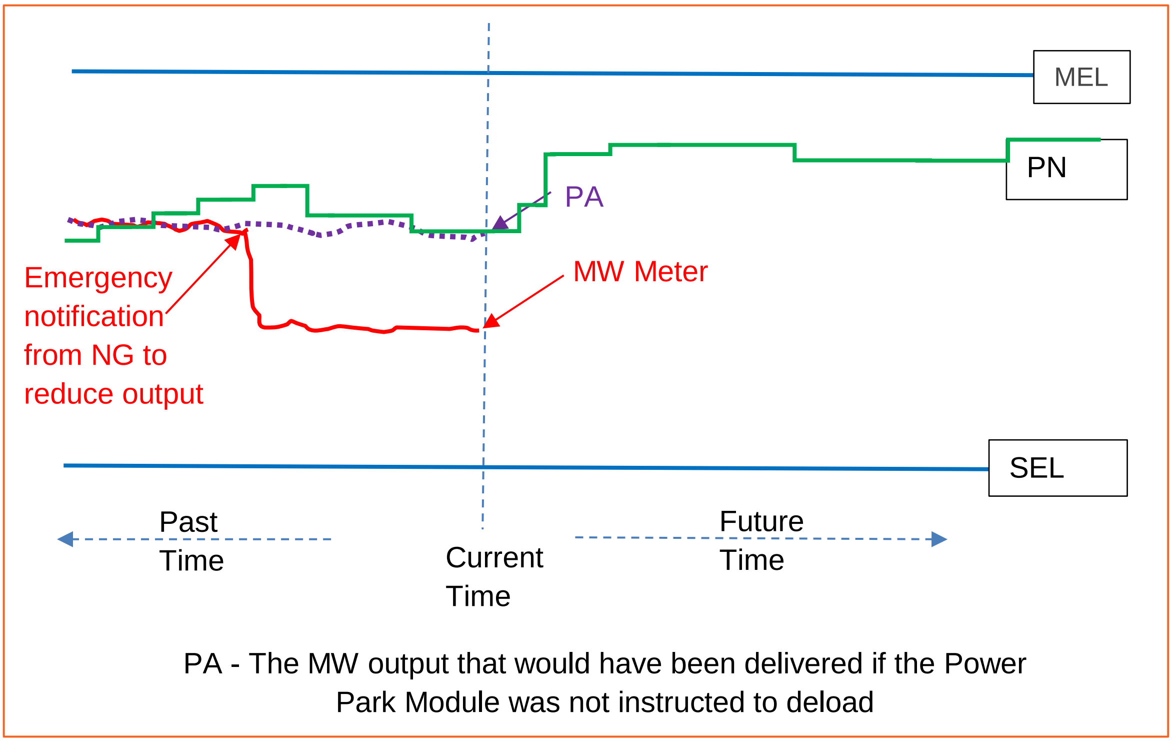
PA - The MW output that would be delivered if the Power Park Module was not instructed to deload

Behaviour During Emergency Instruction

National Grid ESO may ask a Power Park Module to de-synchronise (open breakers), de-energise (reduce output) without sending a BOA instruction. In this case a telephone instruction will be issued explaining the reason and action required. The ESO may say "This is an emergency instruction" or "This is a telephone BOA"

During this period the PA MW value should behave the same as it would during a BOA period.

Figure 6: PA behaviour during Emergency Instruction



Behaviour During Shut Down due to High Winds

This section is specifically applicable to Wind Generators.

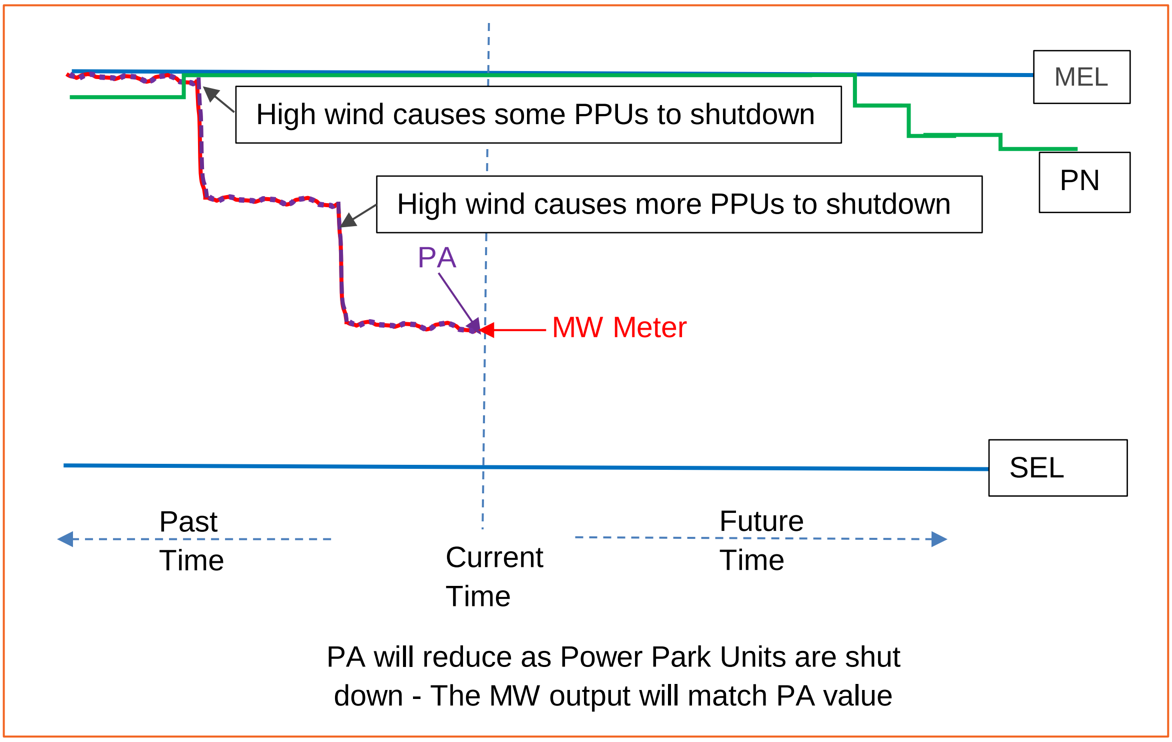
If Power Park Units are shut down due to overspeed/high wind protection, then the PA MW value for the Power Park Module should reduce accordingly. The MW Meter value and the PA MW value should be the same value if the Power Park Module is not deloaded due to a BOA.

If the Power Park Module is deloaded due to a BOA and during this period some of the turbines/all of the turbines shut down, then the PA MW value should reduce as each/all of the turbines shut down.

As soon as the turbines restart the PA MW value should increase accordingly.

It should never be the case during this period of Power Park Unit unavailability that the PA and Meter MW values are different except if the Meter MW is reduced due to BOA instruction or delivering frequency response.

Figure 7: PA Behaviour during High Wind Shutdown



4

Conclusion

Conclusions

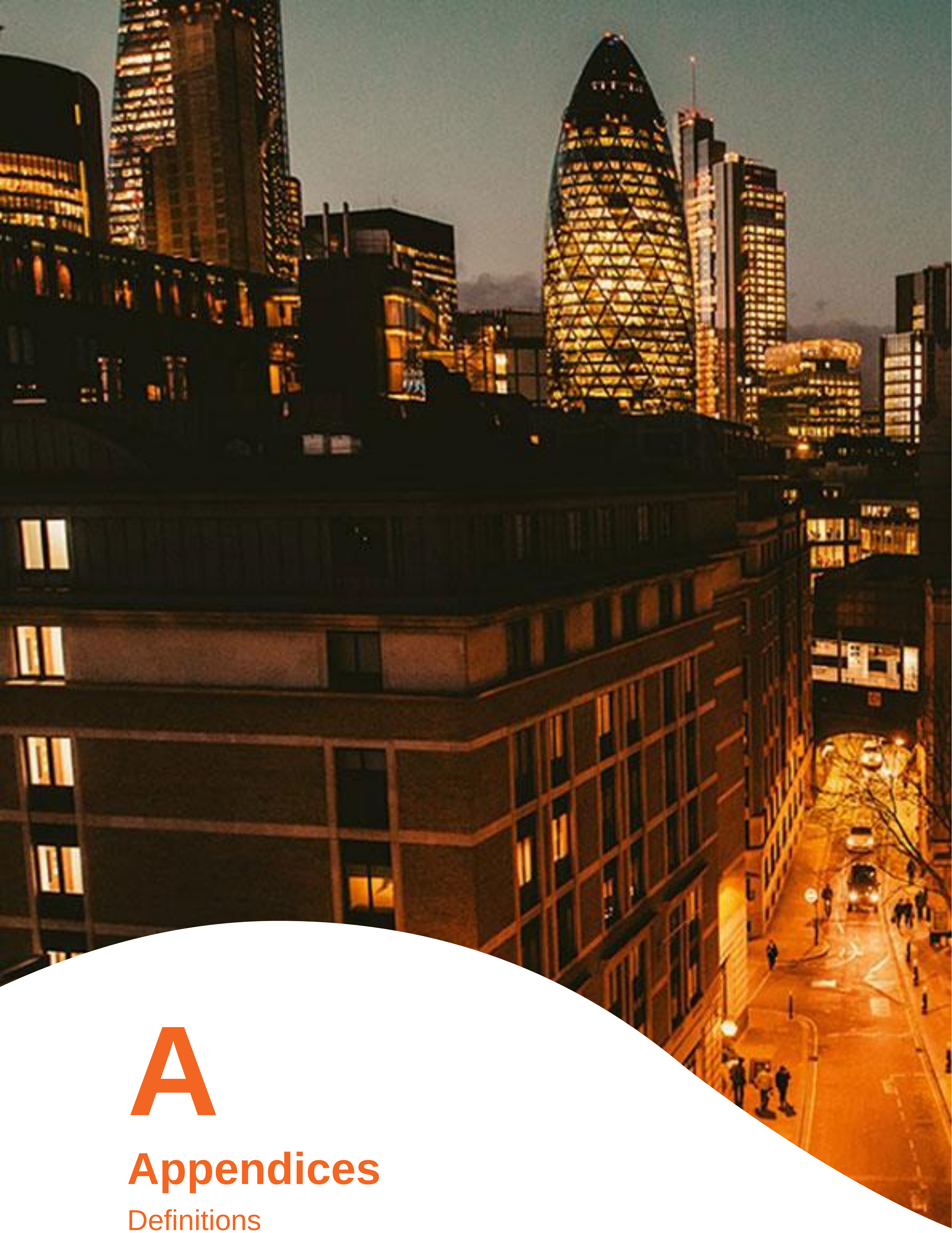
Operational Impact of Insufficient Data

This document has highlighted the consequence and risks of operating the National Electricity System with insufficient or incorrect data. Due to tight margins the National Grid ESO Control Room must know what is being generated and what actions are available to them to effectively operate the system. When this is not available from Intermittent Generators, as discussed in this document, the consequences are that those generators cannot be called on to provide services that would benefit the system.

Operational Impact of Accurate Data

Overall, the total cost of balancing the system will be reduced as the data becomes more accurate. The Power Available signal is key to this as it enables actual positive and negative reserves to be calculated for the system and therefore the correct actions to be taken by the Control Room. This will also lead to less actions being taken by the Control Room which will reduce the cost of balancing the system.

Consistent accurate data will also improve the confidence the Control Room operators have in Intermittent Generators and lead to Power Park Modules more readily being called upon to operate in response and other reserve services.



A

Appendices

Definitions

Definitions

The complete Grid Code can be found online at:
https://www.nationalgrideso.com/codes/grid-code

The Grid Code sets out the operating procedures and principles governing the relationship between The Company and all Users of the National Electricity Transmission System, be they Generators, DC Converter owners, Suppliers or Non-Embedded Customers. The Grid Code specifies day-to-day procedures for both planning and operational purposes and covers both normal and exceptional circumstances

The version used in the writing of this document was The Grid Code Issue 5 Revision 30. Where newer updates contradict this document, The Grid Code's latest release is the authority.

Grid Code Defined Terms	
Power Available	A signal prepared in accordance with good industry practice, representing the instantaneous sum of the potential **Active Power** available from each individual **Power Park Unit** within the **Power Park Module** calculated using any applicable combination of meteorological (including wind speed), electrical or mechanical data measured at each **Power Park Unit** at a specified time. **Power Available** shall be a value between 0MW and **Registered Capacity** or **Maximum Capacity** which is the sum of the potential **Active Power** available of each **Power Park Unit** within the **Power Park Module.** A turbine that is not generating will be considered as not available. For the avoidance of doubt, the **Power Available** signal would be the **Active Power** output that a **Power Park Module** could reasonably be expected to export at the **Grid Entry Point** or **User System Entry Point** taking all the above criteria into account including **Power Park Unit** constraints such as optimisation modes but would exclude a reduction in the **Active Power** export of the **Power Park Module** instructed by **The Company** (for example) for the purposes selecting a **Power Park Module** to operate in **Frequency Sensitive Mode** or when an **Emergency Instruction** has been issued.
Frequency Sensitive Mode	A **Genset**, or **Type C Power Generating Module** or **Type D Power Generating Module** or **DC Connected Power Park Module** or **HVDC System** operating mode which will result in **Active Power** output changing, in response to a change in **System Frequency**, in a direction which assists in the recovery to **Target Frequency**, by operating so as to provide **Primary Response** and/or **Secondary Response** and/or **High Frequency Response**.
Primary Response	The automatic increase in **Active Power** output of a **Genset** or, as the case may be, the decrease in **Active Power Demand** in response to a **System Frequency** fall. This increase in **Active Power** output or, as the case may be, the decrease in **Active Power Demand** must be in accordance with the provisions of the relevant **Ancillary Services Agreement** which will provide that it will be released increasingly with time over the period 0 to 10 seconds from the time of the start of the **Frequency** fall on the basis set out in the **Ancillary Services Agreement** and fully available by the latter, and sustainable for at least a further 20 seconds. The interpretation of the **Primary Response** to a –0.5 Hz frequency change is shown diagrammatically in Figure CC.A.3.2 and Figure ECC.A.3.2

Secondary Response	The automatic increase in **Active Power** output of a **Genset** or, as the case may be, the decrease in **Active Power Demand** in response to a **System Frequency** fall. This increase in **Active Power** output or, as the case may be, the decrease in **Active Power Demand** must be in accordance with the provisions of the relevant **Ancillary Services Agreement** which will provide that it will be fully available by 30 seconds from the time of the start of the **Frequency** fall and be sustainable for at least a further 30 minutes. The interpretation of the **Secondary Response** to a -0.5 Hz frequency change is shown diagrammatically in Figure CC.A.3.2 or Figure ECC.A.3.2.
High Frequency Response	An automatic reduction in **Active Power** output in response to an increase in **System Frequency** above the **Target Frequency** (or such other level of **Frequency** as may have been agreed in an **Ancillary Services Agreement**). This reduction in **Active Power** output must be in accordance with the provisions of the relevant **Ancillary Services Agreement** which will provide that it will be released increasingly with time over the period 0 to 10 seconds from the time of the **Frequency** increase on the basis set out in the **Ancillary Services Agreement** and fully achieved within 10 seconds of the time of the start of the **Frequency** increase and it must be sustained at no lesser reduction thereafter. The interpretation of the **High Frequency Response** to a + 0.5 Hz frequency change is shown diagrammatically in Figure CC.A.3.3.
Balancing Code 1 Descriptions	
Maximum Export Limit (defined under BC1.A.1.3.1)	A series of MW figures and associated times, making up a profile of the maximum level at which the **BM Unit** may be exporting (in MW) to the **National Electricity Transmission System** at the **Grid Entry Point** or **Grid Supply Point** or **GSP Group**, as appropriate. For a **Power Park Module,** the Maximum Export Limit should reflect the maximum possible **Active Power** output from each **Power Park Module** consistent with the data submitted within the **Power Park Module Availability Matrix** as defined under BC.1.A.1.8. For the avoidance of doubt, in the case of a **Power Park Module** this would equate to the **Registered Capacity** less the unavailable **Power Park Units** within the **Power Park Module** and not include weather corrected MW output from each **Power Park Unit.**
Stable Export Limit (defined under BC1.A.1.5)	Stable Export Limit (SEL) expressed in MW at the **Grid Entry Point** or **Grid Supply Point** or **GSP Group**, as appropriate, being the minimum value at which the **BM Unit** can, under stable conditions, export to the **National Electricity Transmission System**.
Physical Notification (defined under BC1.A.1.1)	For each **BM Unit**, the **Physical Notification** is a series of MW figures and associated times, making up a profile of intended input or output of **Active Power** at the **Grid Entry Point** or **Grid Supply Point**, as appropriate. For each **Settlement Period** and the last “to time” should be at the end of the **Settlement Period**.
Notice to Deviate from Zero (NDZ) – (defined under BC.A.1.5)	Notice to Deviate from Zero (NDZ) output or input, being the notification time required for a **BM Unit** to start importing or exporting energy, from a zero **Physical Notification** level as a result of a **Bid-Offer Acceptance**, expressed in minutes.

Minimum Zero Time (MZT) (defined under BC.A.1.5)	Minimum Zero Time (MZT), being either the minimum time that a **BM Unit** which has been exporting must operate at zero or be importing, before returning to exporting or the minimum time that a **BM Unit** which has been importing must operate at zero or be exporting before returning to importing, as a result of a **Bid-Offer Acceptance**, expressed in minutes.
Minimum Non-Zero Time (MNZT) (defined under BC.A.1.5)	Minimum Non-Zero Time (MNZT), expressed in minutes, being the minimum time that a **BM Unit** can operate at a non-zero level as a result of a **Bid-Offer Acceptance**
Bid Offer Acceptance	(a) A communication issued by **The Company** in accordance with BC2.7; or (b) an **Emergency Instruction** to the extent provided for in BC2.9.2.3
MW Meter	Operational Metering as measured at the Grid Entry Point. **BM Participants** must provide operational metering for their total output and for any individual component that may have an output greater than 1MW. This metering must have the following accuracy; a. For a **BM Unit** with either **Generation Capacity** greater than 100MW or **Demand Capacity** greater than 100MW metering accuracy better than 0.5% b. For a **BM Unit** with a **Generation Capacity** greater than 10MW but less than or equal to 100MW or **Demand Capacity** greater than 10MW but less than or equal to 100MW metering accuracy better than 1% c. For all other **BM Units** an accuracy better than 2.5% is required

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