Public

Reserve System Set up for Non-BM Ancillary Service Provider

NESO
National Energy System Operator

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1. Introduction

Reserve Reform aims to update NESO (National Energy System Operator) reserve products to comply with the Clean Energy Package. This reform is intended to re-establish the benefits of firm markets and better meet system and statutory requirements.

Quick Reserve (QR) is a service primarily designed to address pre-fault disturbances, restore energy imbalance quickly and return frequency to 50.0 Hz. Slow Reserve (SR) is primarily aimed at reacting to post-fault disturbances to restore energy imbalances to +/- 0.2Hz within 15 minutes of a loss event (generation or demand).

This document focuses on the introduction of four new Reserve services into the NESO dispatch options:

1. NBM Positive Quick Reserve (PQR);
2. NBM Negative Quick Reserve (NQR);
3. NBM Positive Slow Reserve (PSR); and
4. NBM Negative Slow Reserve (NSR).

This document describes NBM Reserve business logic and processes and is intended to be applicable for all NBM Reserve Services. It is expected that the business and service rules are generally equivalent for any Reserve service with the difference in management being defined and differentiated by the Service and declared parameters – that is, the application of the rule will be impacted by the value of a service or declared parameter.

However, as Slow Reserve is still undergoing market design and consultation, there may be changes to logic and process in this document. If there is a specific process rule for a given service, then it will be specified explicitly.

Negative Reserve units are instructed to increase demand or decrease generation with the inverse true of Positive Reserve. The Quick and Slow Reserve services have distinct delivery parameters and different duration service windows with Quick Reserve consisting of a 30-minute Service Window.

Data exchange (Physical Notifications, Availability, Unavailability) between Service Providers and the Open Balancing Platform (OBP) will be at 30-minute settlement period granularity. Service Providers will submit data for the duration of the service window (at 30-minute granularity) for each service and subsequently, following a dispatch instruction, deliver against the delivery parameters for each service.

Service Providers must develop appropriate web services to communicate with NESO. A separate web service technical document has been published to support the development of service provider web services.

This document explains the rules Service Providers need to implement, including:

- Initial set up of the system.

- Exceptions rules for the web services.
- Timing of data submission.
- The profile to be followed by a provider following an instruction; and
- Crossover rules and how they will be applied.

This document gives a general overview of the NESO-Service Provider data exchange. It should be read in conjunction with:

Document Title
OBP Service Provider – Web Services Specification
Quick Reserve Crossover rules
Quick Reserve Service Terms

These documents can or will (once published) be found at the link below

- https://www.neso.energy/industry-information/balancing-services/reserve-services/quick-reserve

If there is a conflict between this document and the applicable Service Terms, then the applicable Service Terms will prevail.

1.1. Scope

This document applies to non-BM providers only and covers the business rules and exceptions that Reserve service providers must implement. The document covers both the Contracted and Optional aspects of the service.

2. Initial System Set-up Business Rules

Once a provider and unit have pre-qualified for a specific service, NESO will enter the relevant data into the Open Balancing Platform (OBP) system. Each web service URL will be tagged against a Unit ID to facilitate dynamic routing by NESO.

Section 5.2 in the Appendix shows the service parameters applicable to each service.

3. Web Services Business Rules and Exceptions

3.1. General business rules and exceptions

In all web services and data tags, the data should be trimmed to remove any leading or trailing spaces. For example, NESO would expect 'PQR', 'NQR', instead of 'PQR ', 'NQR ' or ' NQR' (etc.) in the service type.

The web service will not be accepted if mandatory tags are not supplied. If optional tags are supplied blank, OBP will replace with 'NULL' value. This is applicable for all the optional fields. The NESO preference is that for optional tags the Service Provider excludes that tag completely from the xml unless mentioned in this document for a particular web service.

NESO will wait for 2 minutes from the OBP send time to receive confirmation back from Service Providers before the system times out.

NESO has provisioned for its systems and Service Providers' systems to be out of sync by only 1 minute. This is reflected in all the DateTimeStamp validations for all web services.

The Operational Day for Reserve is defined to be between 23:00 D to 23:00 D+1 local time which will be broken down into a series of Service Windows for Reserve services. However, data submission to OBP will be based on 30-minute Settlement Periods.

The Reserve services will be procured via a day-ahead auction to secure firm capacity (for the next Operational Day), termed the 'Contracted Service'. Providers can participate via optional availability declarations within-day termed the 'Optional Service'.

Contracted Service

Service providers can bid their units into the day-ahead auction for one or more service windows within an operational day. If successful, they will be awarded linked Contracted Service contract(s) for each discrete Contracted Service Window.

The unit's declared MW for the Reserve Services must remain the same for the entire Contracted Service window length. Utilisation price must remain the same for a single settlement period, but may change between settlement periods.

Prior to Gate Closure (60 minutes in advance of a settlement period), providers must submit the MW and utilisation price via the Availability API for the settlement period considering the requirement for the declared MW to remain consistent across the entire Reserve Service Window, and the utilisation price to remain consistent across the entire settlement period.

Contracted service providers will receive availability payments (pay-as-clear) for the duration of each contracted service window, and a utilisation payment (pay-as-bid) if dispatched, subject to service providers meeting contracted obligations.

The Availability API allows for the submission of declared MW and utilisation price in the same messages and for a valid declaration, both MW and utilisation price must be submitted by gate closure for that settlement period.

Service providers should always submit the MW and Price in same message except for:

- Emergency redeclaration - MW only (0 MW), no Price

- Price-only (no MW value) submission for crossovers

Providers may send a price only declaration for settlement period cross-overs as required.

Additionally, an Operational Baseline PN (Physical Notification) must be submitted for a valid declaration in accordance with the Service Terms.

If a PN is not supplied for a settlement period , the PN will be defaulted to zero. PN defaulting will happen at 18:30 for the next operational day (23:00 to 23:00). Any subsequent valid PN submission will override defaulted values. PN defaulting is to facilitate dispatches and does not replace provider obligations in relation to PN submissions.

A service provider can offer a Contracted or Optional service in each settlement period not both.

Optional Service

A service provider can offer an Optional Reserve Service to NESO outside of any contracted period.

Prior to Gate Closure (60 minutes in advance of a settlement period), providers must submit the MW and utilisation price via the Availability API for the settlement period considering the requirement for the declared MW to remain consistent across the entire Reserve Service Window, and the utilisation price to remain consistent across the entire settlement period.

Providers may send a price only declaration for settlement period cross-overs as required.

If Service Providers are dispatched under the Optional Service, they will receive a utilisation payment (pay-as-bid).

An Operational Baseline PN (Physical Notification) must be submitted for a valid declaration in accordance with the Service Terms

If a PN is not supplied for a settlement period, the PN will be defaulted to zero. PN defaulting will happen at 18:30 for the next operational day (23:00 to 23:00). Any subsequent valid PN submission will override defaulted values. PN defaulting is to facilitate dispatches and does not replace provider obligations in relation to PN submissions.

A service provider can offer a Contracted or Optional service in each settlement period not both.

Utilisation and Crossovers

For a dispatch, NESO will issue a start instruction with a specified start time, followed later by a cease instruction with a specified cease time. Both the start and cease time will reference a whole minute. The unit will be required to follow its declared profile, ramping to and from any changes in declared MW capacity across services windows and adhere to rules relating to crossover periods.

The rules relating to crossover periods have been set out in a separate document published on the Quick Reserve webpage, with the link in the introduction section, it should be read in conjunction with this document.

3.2. Web Service Versioning

To assist with onboarding Reserve, we have introduced a web service version. The web service version for Reserve Services is Version 4. Any changes will be communicated by updating the web specification and this business logic document as appropriate. Pre-qualified providers will be notified by email of any new documentation.

3.3. Availability Service

This web service is used for declaration and redeclaration of a unit's availability MW along with the Utilisation Price. Declarations and any re-declarations from Service Providers should be submitted no later than gate closure for any given settlement period. NESO will reject any (re)declarations which are sent after Gate Closure (60 minutes in advance of the settlement period), aside from emergency redeclarations to zero MW (indicating a unit's unavailability).

The Operational day for Reserve runs from 23:00-23:00. A Service Provider can be available for the Contracted Service (via the award of an auction contract) or the Optional Service (by declaring availability). A Unit can be available either contractually or optionally for any given settlement period.

Providers should monitor and resubmit any rejected declarations to ensure compliance with the service.

Only ServiceType, UnitID, StartDateTime, EndDateTime, BreakPoint for OfferBid_Number 1, UtilisationPrice and DateTimeStamp should be included in the API payload. No other details should be provided, please refer to the sample payloads in the web service specification v4.

A valid declaration for a Reserve service for an operational day is one submitted before Gate Closure for the relevant settlement period. It must contain both a positive integer MW value greater than or equal to zero and a utilisation price. Providers should not submit any declaration for the next operational day, before 16:00 on the preceding operational day.

For Contracted Service, NESO expects providers' declared MW to match their Contracted MW and for consistency of MW across Service Windows. If declarations for settlement periods do not follow these requirements the unit may still be dispatched with its declared parameters, but the provider has not met the service terms obligations.

For the Optional Service, declared MW should be less than or equal to the pre-qualified service capacity MW. A Zero MW declaration will indicate unavailability.

For any given Service Window, MW must remain unchanged. For any given settlement period, the utilisation price must remain unchanged for the settlement period; but may change between settlement periods. Providers may submit an emergency redeclaration, which would contain only 0MW and no price (see later), if the unit is unable to satisfy the previously declared settlement period data.

Providers can submit price separately via the availability web service; this functionality is to support crossovers as described in the separate crossover document published on the Quick Reserve webpage. To support crossovers, a provider may choose to submit a price without MW in the cases where this is permissible as defined in the crossover guidance.

If no declaration/redeclaration has been submitted with a MW value greater than or equal to 1, the unit will be considered as unavailable, unless this is to support the crossover scenario as detailed in the crossover guidance.

Emergency redeclarations:

- Any re-declaration after gate closure for a settlement period is considered an emergency redeclaration.
- For post Gate Closure re-declarations the declared MW value must be 0 for all relevant Settlement Periods.
- The EndDateTime of any declaration may not be in the past for either Contracted or Optional window; i.e no previous Settlement Period in an operational day should be redeclared as 0 MW.
- The StartDateTime should be no earlier than the current Settlement Period.
- If an emergency redeclaration has been submitted for a Settlement Period, then the unit will be made unavailable for dispatch for that Settlement Period.

Service Providers are responsible for submitting the re-declaration of any adjoining Settlement Period(s) with a contracted MW as '0' when submitting emergency re-declarations. Otherwise, NESO will assume that the unit is available for the adjoining Settlement Period(s) and potentially issue a dispatch notification. In the situation where there is an active dispatch for a unit for which a Service Provider sent an emergency re-declaration, NESO will send a cease instruction irrespective of whether the minimum activation period has reached.

Contracted for other balancing services:

If a provider is contracted for a Quick Reserve in a settlement period (e.g. 10:00 to 10:30) and has a contract for another balancing service (e.g. 10:30 to 11:00) in the next settlement period for the same direction as Quick Reserve, their availability declaration for the second settlement period for Quick Reserve (10:30 to 11:00) should be zero MW. This is to ensure that crossovers will not be expected to be delivered in this scenario.

Settlement Period(s)	Contracted Service	Zero MW declaration expectations
10:00 to 10:30	Positive Quick Reserve	
10:30 to 12:30	Positive Slow Reserve	Zero MW for PQR declaration required as PSR is in same direction as PQR.
12:30 to 13:00	Positive Quick Reserve	Zero MW for PSR declaration required as PQR is in same direction as PSQ.
13:00 to 13:30	None	
13:30 to 16:00	Positive Quick Reserve	
16:00 to 16:30	Dynamic Response	Zero MW for PQR declaration required as units is required for Dynamic Response.

Utilisation Pricing:

- A provider will need to provide both a Break Point (MW) value and a Utilisation price if a unit is to be considered for dispatch instructions.
- Prices and MW must be submitted no later than gate closure for the settlement period (60 minutes).
- The declared Utilisation Price must be consistent for the entire service period.
- Emergency Redeclarations should **not** contain pricing information.

Service Providers can submit multiple availability windows (for different period) declaration and / or re- declaration within the same xml for one operational day.

XSD Rejections (Complete file):

1. If ServiceType is missing in the xml, NESO rejects it via XSD validation with an appropriate error message.
2. If UnitID is missing in the xml, NESO rejects it via XSD validation with an appropriate error message.
3. If StartDateTime is missing in the xml, NESO rejects it via XSD validation with an appropriate error message.
4. If EndDateTime is missing in the xml, NESO rejects it via XSD validation with appropriate error message.
5. If DateTimeStamp is missing in the xml, NESO rejects it via via XSD validation with an appropriate error message.
6. If OfferBid_Number is not 1 or is null for a window, NESO rejects it via a XSD validation with and appropriate error message.

7. If neither Utilisation Price nor Breakpoint MW are submitted in the xml, NESO rejects it via XSD validation with an appropriate error message.

File Rejections (Complete file):

1. If the UnitID unit ID does not exist in the OBP application, NESO will send availability confirmation rejection with the error code error code 'OAS_Error1'.
2. If the Unit Id value does not belong to the corresponding service provider, NESO will send an availability confirmation rejection with the error code error code 'OAS_Error2'.
3. If ServiceType is not from the approved list or not matching with the Units Service type, NESO will send availability confirmation rejection with the error code 'OAS_Error3'.
4. If the absolute difference between Service Provider DateTimeStamp and NESOs current system time (in UTC) is greater than one minute, NESO will send availability confirmation rejection with the error code 'OAS_Error4'.

If one or more windows in the request message are invalid or have failed the validations, NESO will send individual error codes for those windows as below (note the File Reason in the SOAP xml will be null):

Window Rejections (Complete file, window level error codes):

1. If EndDateTime is in the past or before StartDateTime, NESO will send window validation as INVALID with the WindowReason 'OAS_Error5'.
2. If StartDateTime/EndDateTime is outside of Service term (Unit pre-qualified activation end date), NESO will send window validation as INVALID with the WindowReason 'OAS_Error6'.
3. If Utilisaton Price is not included while sending the BreakPoint (except emergency redeclaration), NESO will send window validation as INVALID with the WindowReason 'OAS_Error7'
4. If the BreakPoint value for OfferBid_Number 1 (MW values) is not a positive whole number greater than or equal to 0, NESO will send availability confirmation rejection with the WindowReason 'OAS_Error8'.
5. If StartDateTime and EndDateTime received are in seconds (For example: 2022-12-07 13:30:25), NESO will send the ASValidation as INVALID with the WindowReason 'OAS_Error9'.
6. If there is a repetition / duplicate /overlapping of StartDateTime and EndDateTime across two or more Availability Window arrays in a single file, NESO will send window

validation as INVALID for all the affected windows with the WindowReason 'OAS_Error10'.

7. If emergency redeclaration has a BreakPoint for OfferBid_Number 1 other than zero or if a declaration or redeclaration (non-emergency declaration) is sent post gate-closure, NESO will send availability confirmation rejection with the WindowReason 'OAS_Error11'.
8. If there are any values in UtilisationPrice after gate closure NESO will send availability confirmation rejection with the WindowReason 'OAS_Error12'.
9. If any AvailabilityWindow submitted whose windows Start & End is not in format of nearest 30 min rounded off (XX:00 or XX:30) and of 30 minute duration, NESO will reject the availability window with window Reason 'OAS_Error13'.
10. If the declaration is sent before 16:00 for a window starting in the next operational day then NESO will send availability confirmation rejection with the WindowReason 'OAS_Error14'.
11. If a post gate closure zero MW declaration or redeclaration is submitted for a settlement period with no pre-existing valid declaration, NESO will send availability confirmation rejection with the WindowReason 'OAS_Error15'.
12. In the case of an unspecified error, NESO will send window validation as INVALID with the WindowReason 'OAS_Error99'

3.4. Availability Confirmation Service

This web service is primarily used to validate the declaration / re-declaration data submitted by Service Providers. NESO performs data validation at two levels: file level and window level.

If the file has been REJECTED at file level validation with errors – OAS_Error1, OAS_Error2, OAS_Error3, OAS_Error4, the whole file will be rejected and windows marked as invalid (without NESO validation carried out).

For window level rejections the whole file will also be rejected for all windows however, the response from NESO will contain the window level information to identify which submissions are invalid. The file should be identified by the DateTimeStamp which will correspond to the date timestamp which is sent in availability web service. If the file is rejected for window level validations the confirmation message will not contain the file reason.

The Service Provider is expected to resend the entire request payload if the Confirmation is "REJECTED" by NESO.

Availability confirmation will only be marked as 'ACCEPTED' if all the windows in the request are 'VALID'.

Following are the exceptions and the appropriate error responses that would be expected when the xml is sent by Service Provider to NESO:

XSD Rejections:

1. If ServiceType is not from the list or missing, NESO expects Service Provider to XSD validation failure.
2. If UnitID is missing or not valid, NESO expects Service Provider to XSD validation failure.
3. If either StartDateTime or EndDateTime is missing, NESO expects Service Provider to send an error with an appropriate message.
4. If DateTimeStamp is missing, NESO expects Service Provider to send an error with an appropriate message.
5. If Confirmation is not from the list or missing, NESO expects Service Provider to send an error with an appropriate message.
6. If Validation is not from the list or missing, NESO expects Service Provider to send an error with an appropriate message.

Other Rejections :

1. If StartDateTime and EndDateTime is different to the window provided by Service Provider in Availability request, NESO expects Service Provider to send a non 200 http status code back with a message 'Invalid StartDateTime and EndDateTime'.
2. If File or Window Reason is different to the rejection codes mentioned in the above section, NESO expects Service Provider to send a non 200 http status code back with a message 'Invalid Reason in File or Window'.

Using availability confirmation web service, NESO can send error codes for different windows in a single availability confirmation xml. NESO can also send multiple error codes for a single availability window. These error codes will be separated by semicolons.

3.5. Dispatch/Cease Service

Reserve Service Providers should be capable of providing 1 MW or more of reserve volume in line with the service design. Declarations must be made in positive integer MWs.

The volume being supplied under contracted/optional windows may differ across contiguous service periods, in this case a provider should follow their declared MW parameters until a cease instruction or declared unavailability period (whichever is sooner) as described within the crossover guidance.

- NBM units will be dispatched via new Open Balancing Platform (OBP) system.
- The request will comprise of:
    - UnitId,
    - Service Type,
    - DUI (Dispatch Unique Identifier)
    - VolumeRequested,
    - ScheduledDateTime,
    - Instruction,
    - DateTimeStamp

With further details on the content of these parameters in the web specification document v4.

- VolumeRequested is mandatory only for the dispatch instruction and will always be the declared MW value for the appropriate window. The unit must follow the instruction for requested MW from its current PN position.
- NESO will instruct the unit by specifying the ScheduledDateTime in request payload. ScheduledDateTime is the time when unit should start ramping for the requested service i.e. the time to start ramping from PN for a start instruction or the time to start ramping to PN for a stop instruction.
- Dispatch instruction will have 'START' and cease instruction will have 'STOP' in the Instruction tag.
- NESO will not send '0' MW dispatch instructions.
- The cease instruction can be sent by NESO once the unit has completed its Minimum Activation Period. The Minimum Activation Period will be honoured irrespective of the PN level of the Unit. The start time of any further dispatch instruction in the same direction will be after the ramp down time and recovery time for the service is complete. This is service specific, so a PQR cease could be followed by a NQR (or NSR) start instruction before the end of the recovery period for PQR
- A single start instruction will be issued with the unit expected to follow any change in MW (previously declared) as required across multiple windows until a cease is issued. In the unlikely event that a cease is not received, and the unit reaches a settlement period where there is no declared MW, then the unit should be returned to PN (honouring any crossover rules). Once returned to PN, the unit should not resume further Reserve provision until another Start instruction is received
- If following an instruction start and acceptance, and in exceptional circumstances a unit is unable to fulfill its delivery obligations an updated 0 MW availability

declaration must be made for the settlement period(s) impacted and any subsequent settlement periods as required.

- A Cease instruction will Cease any open instructions for that unit and service from the cease scheduled datetime
- The unit must follow the latest instruction sent by NESO for a unit and service.
- A dispatch start instruction can be issued for a future time, if this happens a cease might be sent before the unit has commenced ramping up, in this case the unit should not start ramping as a cease has been issued

Emergency Ceases

Emergency Ceases are ceases where NESO needs a service provider to stop delivering before honouring Minimum Activation Period due to NESO issues. This can be triggered during a service provider's minimum activation period (and a service provider should accept the emergency cease).

If a service provider is technically unable to respond before the Minimum Activation Period is completed the provider can reject the instruction and start ramping down once minimum activation period has been reached.

When Service Provider sends emergency redeclaration while the unit is dispatched, NESO will send cease instruction irrespective of whether the unit has completed the minimum Activation Period. NESO expects Service Providers to accept this cease instruction.

Manual Cease

Manual Cease is to be initiated when there is an emergency at the Service Provider end, and it is not possible to submit an emergency redeclaration. The Service Provider can call NESO to initiate the cease which need not honour the Minimum Activation Period. For Manual Cease instructions, NESO will not send a cease instruction request for a unit and default will consider it as accepted.

XSD Rejections for Service Providers:

1. If ServiceType is not from the list or is missing, NESO expects the Service Provider to throw an XSD validation error.
2. If UnitID is missing, NESO expects the Service Provider to throw XSD validation failure.
3. If DUI is missing, NESO expects the Service Provider to throw XSD validation failure.
4. If value of the Instruction tag is different to that of XSD or missing, NESO expects the Service Provider to throw XSD validation failure.
5. If DateTimeStamp is missing in the xml, NESO expects the Service Provider to throw XSD validation failure.

Error Code Responses from Service Providers:

1. UnitID is not valid, NESO expects Service Provider to send Dispatch / Cease confirmation response with ERROR in the ResponseCode with the associated Errorcode 'ODCS_Error1'.
2. If VolumeRequested is different to the MW Value of the current window, NESO expects Service Provider to send Dispatch / Cease confirmation response with ERROR in the ResponseCode with the associated Errorcode 'ODCS_Error2'.
3. If the absolute difference between NESO DateTimeStamp and Service provider's current system time (in UTC) is greater than 1 min, NESO expects Service Provider to send Dispatch / Cease confirmation response with ERROR in the ResponseCode with the associated Errorcode 'ODCS_Error3'.
4. If there is an unspecified error in the Dispatch or Cease message, NESO expects Service Provider to send Dispatch / Cease confirmation response with ERROR in the ResponseCode with the associated Errorcode 'ODCS_Error99'.

3.6. Dispatch / Cease Confirmation Service

If NESO do not get a confirmation (after receiving a 200 ok response to the dispatch instruction that has been sent by NESO) 2 minutes from the **dispatch** instruction, it will be assumed that service provider has rejected the instruction.

If NESO do not get a confirmation (after receiving a 200 ok response to the cease instruction that has been sent by NESO) 2 minutes from the **cease** instruction, it will be deemed that the Service Provider has ceased the dispatch.

If the start instruction is Rejected/Ignored by Service Provider, the unit would be deemed as unavailable for the entire settlement period that the instruction was to start in.

There will be single dispatch instruction and cease instruction from NESO and unit must follow the profile as per declared MW until the unit is ceased, or if the unit reaches a settlement period with no declared availability as per the crossover guidance.

Provider should follow the latest dispatch or cease instruction sent by NESO for a unit and service.

XSD Rejections from NESO:

1. If ServiceType is missing/null in the xml, NESO rejects the same via XSD validation with appropriate error message.
2. If Unit ID is missing/null in the xml, NESO rejects the same via XSD validation with appropriate error message.
3. If DUI is missing in the xml, NESO rejects the same via XSD validation with error message.

4. If Instruction is missing in the xml, NESO rejects the same via XSD validation with error message.
5. If ResponseCode is missing or is not as per the enumeration list as per web service specification, NESO rejects the same via XSD validation with appropriate error message.
6. If DateTimeStamp is missing in the xml, NESO rejects the same via XSD validation with appropriate error message.

Other Rejections from NESO:

1. If Unit ID is not matching to the dispatch/cease xml payload NESO has sent in request, NESO rejects the same via XSD validation with appropriate error message.
2. If Instruction (START or STOP) is not matching to the dispatch/cease xml payload NESO has sent, NESO rejects the same via XSD validation with appropriate error message.
3. If ErrorCode is different to that of the list mentioned in the above section, NESO rejects the same via XSD validation with appropriate error message.
4. If the absolute difference between Service Provider DateTimeStamp and NESO rejects the same via XSD validation with appropriate error message.
5. If DUI is not matching to the dispatch/cease xml payload NESO has sent, NESO rejects the same via XSD validation with appropriate error message.

If Dispatch / Cease confirmation is received after defined SLA, NESO will reject the confirmation with a message 'SLA breach' in the response.

3.7. Heartbeat Service (Connection Indicator)

Service Providers will use this service to send the heartbeat signal to NESO.

NESO expects to get heartbeat signal for each unit every 5 minutes.

NESO expects the heartbeat signal from the provider for an operational day where they are providing any service contractually or optionally within that operational day.

The only required fields for all Reserve units are; **UnitID, DateTimeStamp**, all other fields should not be submitted.

As this API service is used by NESO to gauge the heartbeat of Service Provider's comms, we would consider the unit to be unavailable if unit missed 2 consecutive Heartbeat signals.

If NESO does not receive any Heartbeat signal in the last 10 minutes, when one is expected because a unit has declared MW, a Heartbeat NACK (Negative Acknowledgement) would be sent with an error code 'OHB_Error1'.

Until the point NESO gets a heartbeat signal back, the unit will be unavailable for electronic dispatch via the web service. If applicable, the unit may be available for Telephone dispatch.

Note- NESO expects Heartbeat signals from only those units which are successfully pre-qualified. Heartbeat is at unit level so if lost all services for the unit will be considered unavailable for electronic dispatch.

The other exceptions are handled as follows.

XSD Rejections:

1. If UnitID is missing/null, NESO rejects the same via XSD validation and Service Provider should be getting a 500 Internal Server Error Response. The response will also provide the details of the error.
2. If DateTimeStamp is missing/null, NESO Middleware rejects the same via XSD validation and Service Provider should be getting a 500 Internal Server Error response back. The response will also provide the details of the error.

Other Rejections:

1. If UnitID does not exist in OBP application, NESO will reject the Heartbeat signal with appropriate error message in synchronous response.
2. If UnitID is not mapped to the appropriate ServiceType selected, NESO will reject the Heartbeat signal with appropriate error message in synchronous response.
3. If the absolute time difference between Service Provider DateTimeStamp and NESO's current system time (in UTC) is greater than 1 min, NESO will reject the Heartbeat signal with appropriate error message in synchronous response.
4. If the Unit Id value does not belong to the corresponding service provider, NESO will send rejection synchronously with appropriate error message.

3.8. Heartbeat Negative Acknowledgement Service

Heartbeat Negative Acknowledgement (NACK) is a message to communicate that NESO has not received the heartbeat signal for the last 10 minutes for that unit or there is some issue with the unit's Heartbeat that has been sent.

Unit will be considered unavailable until the heartbeat signal is resumed.

Exceptions:

1. If UnitID is missing, NESO expects Service Provider to throw 500 Internal Server Error as XSD validation failure.

2. If UnitID is not valid, NESO expects Service Provider to send a non 200 http status code back with a message 'Invalid UnitID'
3. If StartDateTime or EndDateTime is missing, NESO expects Service Provider to throw 500 Internal Server Error as XSD validation failure.
4. If ErrorCode not in the list as mentioned in the previous section, NESO expects Service Provider to send a non 200 http status code back with a message 'Invalid ErrorCode'
5. If DateTimeStamp is missing, NESO expects Service Provider to throw 500 Internal Server Error as XSD validation failure.
6. If the absolute difference between NESO DateTimeStamp and Service Provider's current system time (in UTC) is greater than 1 min, NESO expects Service Provider to send a non 200 http status code back with a message 'Invalid DateTimeStamp'.

3.9. Physical Notification Service

This service will be implemented by NESO to receive the Physical Notification data from Service Providers.

- Service Provider can send the Physical Notification data, after the unit is pre-qualified.
- Service Provider can send the PN data at Unit level and once the PN is received for a Unit, the same PN would be applicable for all the active services of the Unit.
- The expected time format for all the date time fields is UTC.
- Service Providers should send the StartDateTime and EndDateTime for PN at a minute level.
- Units can submit PNs even if not contractual or optional available for the whole operational day(s), with this being the NESO preference
- Physical Notification data would be accepted for current as well as future 5 operational days. The Service Provider can submit multiple PN declarations and/or re-declaration for a Unit for an operational day within the same request xml.
- If the unit is contracted for an operational day for a single service, NESO expects the provider to submit PNs for the entire operational day.
- If a unit intends to be optionally available for an operational day even for single period and single service, NESO's preference is for PNs to be submitted for the entire operational day, however as a minimum the PN should be submitted for the optional periods and any following settlement period (including if the optional period is the last one of the operational day).

- If a provider fails to update PNs for the following operational day by 18:30, NESO will use a default PN of 0 for any applicable settlement period without submitted PNs.
- Service Providers can update Physical Notifications as more accurate information becomes available up to gate closure (60 mins) before the start of a settlement period.
- Service Provider to ensure at least 1-minute time gap between the submission of a PN redeclaration and a subsequent update for the same Settlement Period.
- Physical Notification should cover the complete half hour settlement period in the same request payload.
  e.g.

UnitID	Start TIME	End Time	Start MW	END MW
Unit-1	10:00	10:30	5	20
Unit-1	14:00	14:20	10	20
Unit-1	14:20	14:30	20	10

- The following fields are required to be populated by Service Providers in the xml payload. UnitID, PUI, StartDateTime, EndDateTime, PN_Start_MW, PN_End_MW and DateTimeStamp in the xml. No other details should be provided, refer the latest web service specification v4 document.

- **XSD Rejections:**

1. If UnitID is missing/null in the xml, NESO rejects the same via XSD validation and will also provide the details of the error.
2. If PUI is missing/null/invalid (not 20 chars) in the xml, NESO rejects the same XSD validation and will also provide the details of the error.
3. If StartDateTime is missing in the xml, NESO rejects the same via XSD validation and will also provide the details of the error.
4. If EndDateTime is missing in the xml, NESO rejects the same via XSD validation and will also provide the details of the error.
5. If PN_Start_MW is missing in the xml, NESO rejects the same via XSD validation and will also provide the details of the error.
6. If PN_End_MW is missing in the xml, NESO rejects the same via XSD validation and will also provide the details of the error.
7. If DateTimeStamp is missing in the xml, NESO rejects the same via XSD validation and will also provide the details of the error.

File Level Rejections (Complete file)

1. If the UnitID does not exist in OBP application, or unit is expired (not within Unit's activation period), NESO will send confirmation rejection with the FileReason 'OPN_Error1'.
2. If the Unit Id value does not belongs to the corresponding service provider, NESO will send the availability confirmation rejection with appropriate error code 'OPN_Error2'.
3. If the absolute difference between Service Provider DateTimeStamp and NESOs current system time (in UTC) is greater than one-minute, NESO will send confirmation rejection with the FileReason 'OPN_Error3'.

If one or more windows in the request message are invalid or have failed the validations, NESO will send individual error codes for those windows as below (note the File Reason in the SOAP xml will be null):

Window Level Rejections (Complete file, window level error codes):

1. If the request payload contains the data outside of future 5 operational days from the current date, NESO will send the PN Confirmation rejection with the FileReason 'OPN_Error4'.
2. If the Physical Notification "date/time from" is not earlier than its "date/time to" , NESO will send the PN Confirmation rejection with the FileReason 'OPN_Error5'.
3. If StartDateTime and EndDateTime is overlapping with other windows StartDateTime and EndDateTime in the same file, NESO will send PN Confirmation rejection with the FileReason 'OPN_Error6'.
4. If PN_Start_MW and PN_End_MW values are not within the range of -9999 MW to maximum generation capacity of the unit NESO will send PNValidation as INVALID with PNReason 'OPN_Error7'.
5. If DateTimeStamp and StartDateTime of the settlement period is less than 60mins, NESO will send PNValidation as INVALID for the affected windows with PNReason 'OPN_Error8'.
6. The submitted Physical Notification must cover the complete half hour settlement periods in addition a subset of the records must have StartDateTime fields corresponding to the start of each half hour period covered or NESO will send the PNValidation as INVALID with PNReason 'OPN_Error9'.
7. If StartDateTime and EndDateTime received are in seconds (For example: 2022-12-07 13:30:25), NESO will send the PNValidation as INVALID with PNReason 'OPN_Error10'.

3.10. Physical Notification Confirmation Service:

This service will be implemented by Service Providers to receive Confirmation for the Physical Notification from NESO.

This web service is primarily used to validate the PN data submitted by the Service Providers and to send the confirmation back. There are two levels of data validation done by NESO – one at file level (File Rejections) and the other at a window level (Window Rejections) as mentioned above.

If the file has been REJECTED at file level validation with errors – OPN_Error1, OPN_Error2, OPN_Error3, the whole file will be rejected and windows marked as invalid (without NESO validation carried out).

For window level rejections the whole file will also be rejected for all windows however , the response from NESO will contain the window level information to identify which submissions are invalid. The file should be identified by the DateTimeStamp which will correspond to the date timestamp which is sent in availability web service. If the file is rejected for window level validations the confirmation message will not contain the file reason.

The Service Provider is expected to resend the entire request payload if the Confirmation is "REJECTED" by NESO.

Following are the exceptions and the appropriate error responses that would be expected when the xml is sent by Service Provider to NESO:

XSD Rejections:

1. If UnitID is missing, NESO expects Service Provider to throw XSD validation failure.
2. UnitID is not valid, NESO expects Service Provider to throw XSD validation failure.
3. If either StartDateTime or EndDateTime is missing when Confirmation tag is ACCEPTED, NESO expects Service Provider to throw XSD validation failure.
4. If PNValidation is not from the list or missing when Confirmation tag is ACCEPTED, NESO expects Service Provider to throw XSD validation failure.
5. If DateTimeStamp is missing, NESO expects Service Provider to throw XSD validation failure.
6. If Confirmation is not from the list or missing, NESO expects Service Provider to throw XSD validation failure.

Other Rejections:

1. If StartDateTime and EndDateTime is different to the window provided by Service Provider, NESO expects Service Provider to send a non 200 http status code back with a message 'Invalid StartDateTime and EndDateTime'.

2. If FileReason is different to the rejection codes mentioned in the above section, NESO expects Service Provider to send a non 200 http status code back with a message 'Invalid Reason in File or Window'.
3. PNReason is different to the rejection codes mentioned in the above section, NESO expects Service Provider to send a non 200 http status code back with a message 'Invalid Reason in File or Window'.

Using Physical Notification Confirmation web service, NESO can send error codes for different window periods in a single Physical Notification Confirmation xml. NESO can also send multiple error codes for a single window period. These error codes will be separated by semicolons.

4. Security rules and exceptions:

As per the Web Service Specifications document, NESO is expecting all the web services to be authenticated with usernames and passwords. Each Service Provider will have one set of username and password pair i.e., if the Service Provider has multiple contracts across any ancillary service types, NESO will provide a single pair of username and password across all Unit IDs. If Service Provider sends an incorrect username and password or if there is a combination mismatch to the username and password to that of Unit ID in the web services, NESO will send the appropriate error (500 Internal server error for any exception or XSD validation failure). It is expected for Service Providers to send the same to NESO.

5. Appendix

5.1. Sign Convention

It is a pre-requisite that the sign convention adopted for volumes and availabilities is common across BM & NBM for all Reserve service providers, for example:

- Metering data is Positive for Export, and Negative for Import
- PN and FPN is Positive for Export, and Negative for Import
- Irrespective of service, declared MW values should always be a positive integer value

5.2. Service Parameters

Data Item	Description	PQR/NQR
Unit ID	ID of a Unit, EG. 'NBM-123' (Service Provider can have multiple Units pre-qualified)	

Data Item	Description	PQR/NQR
Unit Start Date	Start date of Unit as per accepted Pre-qualification/Registration Procedure	
Unit End Date	End date of unit as per accepted framework agreement (Pre-qualification/Registration)	
Response Time	The period inclusive of notification to start ramp for the service and the ramp period.	No longer than 1min
Time to Full Delivery (TTFD)	The ramp period for pre-qualified units to reach pre-qualified service capacity MW from the start of the ramp period.	No longer than 1min
Cease Time	The period for pre-qualified units to reach the PN (Physical Notification) from the start of a cease instruction.	
Recovery Period	The period after a pre-qualified unit has reached its PN following a cease instruction and represents the time during which no further instructions will be sent for a Reserve service, in the same direction, delivered under the previous instruction e.g. the time between the cease of a PQR and the start time of another PQR/PSR instruction.	No longer than 3mins
Minimum Activation Period	The minimum period a pre-qualified unit has specified a Reserve instruction should continue for which includes; ramp time to declared MW capacity, time at declared MW capacity and ramp time back to PN.	No longer than 5mins
Pre-qualified Service Capacity (MW)	The capacity a pre-qualified unit has prequalified for a Reserve service.	
MW for the settlement period	Declared MW	

5.3. Ramp rate calculation:

The ramp rates applicable for a unit and service will be calculated based on the Pre-qualified Capacity and the Time to Full Delivery or Cease Time as follows:

Service	Ramp Up Rate (MW/min)	Ramp Down Rate (MW/min)
Positive	$\frac{\text{[Pre-qual MW]}}{\text{[Time To Full Delivery]}/60}$	$\frac{\text{[Pre-qual MW]}}{\text{[Cease Time]}/60}$
Negative	$\frac{\text{[Pre-qual MW]}}{\text{[Cease Time]}/60}$	$\frac{\text{[Pre-qual MW]}}{\text{[Time To Full Delivery]}/60}$

5.4. Notice Period

The notice period that is required between the receipt of an instruction (dispatch/cease) before the unit will start ramping is calculated as follows:

Service	Notice to Deliver (minute)	Notice to Cease (minute)
Positive	$\frac{\text{[Response Time]}}{60} - \frac{\text{[Time to Full Delivery]}}{60}$	$\frac{\text{[Response Time]}}{60} - \frac{\text{[Cease Time]}}{60}$
Negative	$\frac{\text{[Response Time]}}{60} - \frac{\text{[Time to Full Delivery]}}{60}$	$\frac{\text{[Response Time]}}{60} - \frac{\text{[Cease Time]}}{60}$