STOR System Set up for Ancillary Service Provider

DOCUMENT CONTROL

Change History

VERSION	DATE	CHANGES
1.0	13/09/2018	First Version
1.1	29/10/2018	DateTimeStamp validations; minor changes to other exceptions
1.2	05/08/2019	Optional window declaration pattern validation; Gateclosure for emergency redeclaration for firm and optional windows; Removal of validation requirement from Service Provider for Availability Confirmation; Manual cease definition; Real-time metering expectations from Service Providers; Settlement metering additional rules and how to deal with dummy contracts
1.3	28/10/2019	EBGL Changes
1.4	27/11/2020	CEP 6.9 Changes
1.5	19/06/2021	1. Changes done under 'Dispatch/Cease service' section: 1.a. To ensure the VolumeRequested attribute is validated with reference to current window MW. 1.b. Updated workflow to be followed in ASDP after receiving an error response from the service provider corresponding to a unit. 2. Changes done 'Settlement Metering service' section to ensure any settlement metering data should come from the service provider after the start of the service term of a particular unit.

NEXT UPDATE	VERSION	PLANNED CONTENTS
1.6	01/03/2024	Updated section 3.7 with Minimum Non-Zero Time logic.

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1 Introduction

The PAS (Platform Ancillary Services) project has an objective to replace and enhance systems across the Ancillary Service lifecycle. Starting with a flexible dispatch platform, capable of sending and receiving data, such as provider availability submissions and dispatch notifications. The platform has already been rolled out to include N-BM Fast Reserve, this document will focus on the addition of N-BM Short Term Operating Reserve (STOR). In order for Service Providers to communicate with National Grid ESO they are required to develop the appropriate web servicesas per the technical specifications.

This document explains the business rules Service Providers need to implement, including the initial set up of the system and the exceptions rules for the web services.

1.1 Scope

This document applies to Non-BM providers only and covers the business rules and exceptions which are to be implemented by STOR service providers. This document covers both the Committed and Flexible aspects of the service.

2 Initial System Set-up Business Rules

Once a Unit has been accepted and pre-qualified, the contract data related to the unit will be placed into the PAS application by National Grid ESO and the web service urls will be placed in the National Grid ESO middleware. Each of theweb service urls will be tagged against a Contract ID (for the purpose of this document, the Contract ID is your unique Unit ID in your framework agreement) and the dynamic routing will happen from National Grid ESO middleware.

The following data items are applicable for both the Committed and Optional (STOR) Service

Data Item	Description
Contract ID	ID of a contract, this will match the Contract Number EG. '99.98' (Service Provider can have multiple contracts)
Contract Start Date	Start date of contract as per accepted tender or framework agreement
Contract End Date	End date of contract as per accepted tender or framework agreement
Response Time	The time period (in minutes), for the Contracted Unit or Contracted Site to reach their Contracted MW from the pre-instruction MW after sending a Dispatch Instruction
Recovery Period	means for the period specified in the STOR Contract which commences upon expiry of the Cease Time
Cease Time	The time period (in minutes), for the Contracted Unit or Contracted Site to reach zero MW from their Contracted MW after sending a Cease Instruction
Minimum Non Zero Time	The minimum time in minutes a service provider must remain above zero MWs

Ramp Up	MW / Minute
Ramp Down Rate	MW / Minute
Contracted MW per window	Contract or Prequalified MW
Telephone	Telephone number that National Grid ESO Electricity ControlRoom can call in the event of a manual intervention

All prequalified STOR contracts map to STOR_OPT Service Type, Committed STOR contracts map to the Service type STOR in the webservices. In the following document there are many terms which may refer to a contract, in a case where there is not a contract in place it will refer to a framework agreement or other relevant agreements.

3 Web Services Business Rules and Exceptions

3.1 General business rules and exceptions

In all the web services and for all the data tags, the data should be trimmed and should be without any spaces before or after the data. For example, National Grid ESO would expect 'STOR' instead of 'STOR ' or' STOR' in the service type.

The web service will not be accepted if Service Providers send any blank tags. This will mean the 'NULL' value will be updated in the PAS system. This is applicable for all the optional fields. If the field is optional, National Grid ESO would expect Service Provider to ignore that tag completely from the xml unless mentioned in this document fora particular web service.

If Service Provider sends blank tag for mandatory tags, PAS will update 'NULL' value in the system.

Except for dispatch / cease instruction web service (which is for 30 seconds), National Grid ESO will wait for 1 minuteto get synchronous response back from Service Providers before the system times out.

National Grid ESO has made a provision for its systems and Service Providers' systems to be out of sync only by 1minute. This is reflected in all the DateTimeStamp validations for all web services.

3.2 European Balancing Guidelines (EBGL) Changes

As of the 18th December 2019, the EBGL changes will come into force and this version of the document is relevant to this change going live. Exact implementation date will be confirmed by National Grid ESO Contractsteam. The changes which are relevant to the dispatch system through PAS are mentioned below in a highlevel and in detailed throughout the relevant sections.

1) Utilisation prices will no longer be part of the contract so will need to be submitted with declarations
2) A new Service type (STOR_OPT) has been added to deal with Optional bids
3) Partial declarations will be allowed to be submitted (i.e. MW and no Price or Price and no MW) as per below availability section
4) STOR_OPT will be allowed to submit different MWs per window

Note: please see the availability section for specific details.

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3.3 Clean Energy Package (CEP) 6.9 Changes

By 1st April 2021, the CEP 6.9 changes will come into force and this version of the document is relevant to this change going live. Exact implementation date will be confirmed by National Grid ESO Contracts team. Beloware the high-level changes relevant to the dispatch system which are detailed in the appropriate sections, later in the document.

1. Once a contract has been awarded each successful STOR unit will be required to submit an availability declaration ahead of the contracted service.
2. This will include confirmation of MW Available and the Utilisation price.
3. In ASDP, All the Non-BM STOR units will follow STOR_OPT rules irrespective of the tender status (Committed/Optional).
4. Have a blanket MW validations as that of STOR_OPT for all the contracts.
5. Week ahead gate closures will no longer be applicable to the contracts relevant to all the service types
6. The existing gate closure rules for re-declaration i.e., 90 mins for Firm Windows and 00:00 hours for Optional Windows will prevail for all contracts.
7. Nominations Service will be made redundant due to daily tendering.
8. Service Providers may send in availability declarations/re-declarations for a Non-BM STOR unit well in advance before the tender closure or gate closure.
9. Where no declaration/redeclaration has been submitted, the unit will be declared as unavailable.

3.4 Web Service Versioning

We have introduced web service version to help with traceability for onboarding new Ancillary Services. Current webservice version for STOR is Version 2, any changes will be communicated by updating the web specification and business logic document appropriately. Providers will be notified by email of any new documentation.

3.5 Availability Service

This web service is used for declaration of an availability window. It is also used to redeclare and emergency redeclare. In a normal situation, National Grid ESO would expect to see declarations and re-declarations from Service Providers (SP) in advance of before gate closure of any given window. The StartDateTime and EndDateTime should be in the future. In normal situations, National Grid ESO will reject any declaration which are sent after Gate Closure.

In all the situations, National Grid ESO expects to only have ServiceType, ContractID, StartDateTime, EndDateTime, BreakPoint for OfferBid_Number 1, UtilisationPrice and DateTimeStamp in the xml. No other details should be provided, refer to the sample payloads in the Appendix of web service specification.

The Operational day for STOR starts from 0500 local time. The firm window timings are published in National Grid ESOwebsite (link) as part of the tender rounds document. Each optional windows falls between the firm windows except during operational day cross over. For example, optional window will be from 05:00 to 06:30 on 01 Nov 2019 and the previous optional window will be from 20:30 31 Oct 2019 to 05:00 01 Nov 2019.

Availability for the NBM STOR contracts and two window types must be submitted adhering to the below business rules of STOR_OPT Service Type.

Post Tender declarations/redeclarations:

Service Providers may send availability declarations for a Non-BM STOR unit well in advance before the tender closure.

- A declaration must be submitted from Service Providers before the gate closure times following the STOR_OPT rules.
- If the unit has been awarded a contract post tender closure but for a different contracted MW as compared to the previous declaration, a re-declaration must be submitted from Service Providers with the appropriate contracted MW.
- If the unit has not been awarded or if a unit is awarded but for the same MW as that of the previous declaration, the previously submitted declarations will be considered for dispatch and settlements.
- For dispatch purposes, ASDP will consider the MW submitted in the latest availability payload.
- If re-declarations are not submitted for change in MW post tender award (and before gate closure) there are chances of penalties during settlements.

First time declarations:
- The payload must have BreakPoint (MW) value for OfferBid_Number 1 as per the below table

ServiceType	Firm Windows	Optional Windows
STOR_OPT (Optional)	0 or >=3 and <=Prequalified MWs or Null	0 or >=3 and <=Prequalified MWs or Null

- The payload could have UtilisationPrice for all contracts and windows
- If submitting for optional windows, all the optional windows for the entire operational day must be submitted. This is applicable for all STOR contracts as this is the first declaration.

The BreakPoint (MW) value for all the optional windows for the entire operational day must be the same value but the UtilisationPrice value can vary. The following table provides the submission cut-off periods for all the contracts and window types:

ServiceType	Firm Windows	Optional Windows
STOR_OPT (Optional)	Must be submitted before 90 mins of the start of the Window	Must be submitted before 00:00 of the start of the operational day

All the other (re) declarations except the first and last:
- The payload could have BreakPoint (MW) value for OfferBid_Number 1 for all contracts and windows
- The payload could have UtilisationPrice for all contracts and windows.
- The BreakPoint (MW) value for all the optional windows for the entire operational day must be the same value but the UtilisationPrice value can vary.
- The same BreakPoint (MW) value submission rules apply in this scenario as well.

Last declarations / redeclarations:
- The gateclosure for last (re) declaration for Firm Windows is before 90 min of start of window and no Firm Window availabilities should be submitted post this gateclosure for all contracts.
- The gateclosure for last (re) declaration for Optional Windows is before 00:00 of the start of the operational day and no Optional Window availabilities should be submitted post this gate closure for all contracts. For example, all the redeclarations for Operational day starting 05:00 on 01 Nov 2019 should be submitted before 00:00 01 Nov 2019.
- The BreakPoint (MW) value for all the optional windows for the entire operational day must be the same value but the UtilisationPrice value can vary.

- The same BreakPoint (MW) value submission rules apply in this scenario as well.

Emergency redeclarations:
- Any re-declaration post the above mentioned gate closure is considered as emergency redeclaration.
- Post gate closure BreakPoint (MW) value for all Firm Windows must be 0 for all contracts.
- Post gate closure BreakPoint (MW) value for the current and future Optional Windows for that operational day must be 0 for all contracts.
- The EndDateTime of any window must not be in the past for all contracts and all window types. i.e. No window in an operational day in the past should be redeclared as 0.
- For settlement purposes, National Grid ESO will consider the DateTimeStamp as StartDateTime in the case of emergency re-declaration if the submission is sent after the window has started. It should be noted that Service Provider has responsibility to submit the re-declaration of any adjoining window with a contracted MW '0' in case they have submitted emergency declarations. Otherwise, National Grid ESO will assume that Service Provider is available for the next adjoining window and could send a dispatch notification.

In the situation where there is an active dispatch for the contract for which Service Provider sent emergency re-declaration, National Grid ESO will send an auto-cease irrespective of whether the MNZT has reached.

Utilisations Pricing:
- As part of the EBGL features prices are able to send separately from MWs.
- A provider will need to provide both a Break Point (MW) value and a Utilisation price, however this doesn't need to be in the same payload.
- The MWs must be submitted by the times detailed in the above table.
- All prices must be submitted before 90 minutes of the start of the window (i.e. Firm or Optional)
- If no price is submitted the window will not be available for Dispatch.
- Optional window prices submitted after the Optional gate closure should not contain a MW.
- Emeregency Redecs should not contain pricing information.
- If a price is submitted without a MW it will take the last declared MW for that window, if non-exists it will be unavailable till a MW is submitted.

Season ends

Season cross over will follow the same principle as that to the operational day cross over except that the firm window for the next season could be different.

For example:

If season 1 ends 5th January 05:00 but the last availability window ends on the 4th January 21:30, National Grid ESO will create an optional window which would start at 4th January 21:30 and ends 5th January 05:00. Season starts works on the same principle.

As mentioned in the technical specification, SP's can submit multiple availability windows declaration and / or re-declaration within the same xml.

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

XSD Rejections:

1. If ServiceType is not from the list from the XSD or missing value, National Grid ESO 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.

2. If ContractID is missing in the xml, National Grid ESO Middleware rejects the same via XSD validation and ServiceProvider should be getting a 500 Internal Server Error response back. The response will also provide the details of the error.

3. If StartDateTime is missing in the xml, National Grid ESO 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.

4. If EndDateTime is missing in the xml, National Grid ESO 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.

5. If DateTimeStamp is missing in the xml, National Grid ESO 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

6. If ContractID value differs to what has been set up in PAS application (or NULL value in the tag), National Grid ESOwill send a non-200 Internal Server Error synchronously with a message 'Invalid ContractID' back to the SP.

File Rejections (All windows should be considered invalid):

7. If the absolute difference between Service Provider DateTimeStamp and National Grid ESOs current system time(in UTC) is greater than one minute National Grid ESO will send availability confirmation rejection with the FileReason 'AS_Error9'

Window Rejections (Only for the specified window):

8. If StartDateTime and EndDateTime is not matching to the availability window as per contract, National Grid ESO will send availability confirmation rejection with the WindowReason 'AS_Error3'.

9. If EndDateTime is in the past, National Grid ESO will send availability confirmation rejection with the WindowReason 'AS_Error4'.

10. If there are any values in Availability Prices, National Grid ESO will send availability confirmation rejection with theWindowReason 'AS_Error7'.

11. 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, National Grid ESO will send availability confirmation rejection with the WindowReason 'AS_Error11'.

12. If EndDateTime is outside of Service term (contract end date), National Grid ESO will send availability confirmationrejection with the WindowReason 'AS_Error24'.

13. If OfferBid_Number is not 1 or is Null for the window, National Grid ESO will send availability confirmation rejection with the WindowReason 'AS_Error25'.

14. If more than one OfferBid array or OfferBid_Number is provided for a single AvailabilityWindow array in a file National Grid ESO will send availability confirmation rejection for the affected windows with the WindowReason'AS_Error26'

15. If there is a repetition / duplicate of StartDateTime and EndDateTime across two or more AvailabilityWindow arrays in a single file, National Grid ESO will send availability confirmation rejection for the affected windows with the WindowReason 'AS_Error27'.

16. If the emergency re-declaration misses any one of the current or future windows, all the optional windows for the emergency re-declaration will be rejected by National Grid ESO with WindowReason 'AS_Error28'.

17. If any of the optional windows have different OfferBid (MW) values to the rest of the optional windows or any of the optional windows are missing in a particular operational day (i.e. it has to either be 0 or contracted MWs) submitted before gateclosure, ASDP will reject all the windows of that particular operational day with WindowReason 'AS_Error29'

18. If there are any values in UtilisationPrice after gate closure National Grid ESO will send availability confirmation rejection with the WindowReason 'AS_Error30'.

19. If the BreakPoint value for OfferBid_Number 1 (MW values) is not 0 or between 3MWs and the prequalified MW and the value is not a whole number (Only applicable for STOR_OPT), National Grid ESO will send availability confirmation rejection with the WindowReason 'AS_Error31'.

20. If the OfferBid Number 1 does not have at least one of the UtilisationPrice or BreakPoint, National Grid ESO will send availability confirmation rejection with the WindowReason 'AS_Error32'.

21. In the case of an unspecified error, National Grid ESO will send availability confirmation rejection with the WindowReason 'AS_Error99'.

Deprecated Error codes (for reference)

22. If there are any values in UtilisationPrice irrespective of whether it is Committed STOR / Flexible contract / window, National Grid ESO will send availability confirmation rejection with the WindowReason 'AS_Error5'

23. If ContractID is not mapped to the appropriate ServiceType selected, National Grid ESO will send availability confirmation rejection with the FileReason 'AS_Error2'.

24. If the first declaration has any values in BreakPoint for OfferBid_Number 1 (MW values) other than contracted MW in the contract data or '0' (only applicable for STOR and STOR_FLEXIBLE), National Grid ESO will send availability confirmation rejection with the WindowReason 'AS_Error6'.

25. If availability submitted after submission cutoff has no valid previous declarations to redeclare (only applicable for STOR and STOR_FLEXIBLE), National Grid ESO will send availability confirmation rejection with the WindowReason 'AS_Error23'.

It should be noted that the multiple error codes have a limit of 200 characters. In the case of error codes exceeding 200 characters, the reasons will be trimmed to 200 characters.

3.6   Availability Confirmation Service

This web service is primarily used to validate the declaration / re-declaration data submitted by Service Provider. There are two levels of data validation done by National Grid ESO – one at file level and the other at a window level.

If any of the exceptions mentioned in the above section occur for File level rejection, the availability confirmation will be marked as 'REJECTED' with appropriate reason code as mentioned in the above section in the FileReason tag. If the confirmation is marked as 'REJECTED' all windows should be considered as rejected for the availability file submission. If the file has been REJECTED the confirmation response will not contain any availability windows, the file should be identified by the DateTimeStamp which will correspond to the date timestamp which is sent in the availability web service.

If any of the exceptions mentioned in the above section above occur for Window level rejection, the availability confirmation will be marked as 'ACCEPTED' but the Availability Window array(s) with error(s) will have

appropriate WindowReason error code. The Service Provider is expected to resend the correction only for those windows which have been rejected by National Grid ESO.

XSD Rejections:

1. If ServiceType is not from the list or missing, National Grid ESO expects Service Provider to throw 500 InternalServer Error as XSD validation failure.

2. If ContractID is missing, National Grid ESO expects Service Provider to throw 500 Internal Server Error as XSDvalidation failure.

3. If ContractID is not valid, National Grid ESO expects Service Provider to send a non 200 http status code back witha message 'Invalid ContractID'.

4. If either StartDateTime or EndDateTime is missing, National Grid ESO expects Service Provider to throw 500Internal Server Error as XSD validation failure.

5. If DateTimeStamp is missing, National Grid ESO expects Service Provider to throw 500 Internal Server Error as XSDvalidation failure.

6. If Confirmation is not from the list or missing, National Grid ESO expects Service Provider to throw 500 InternalServer Error as XSD validation failure.

7. If Validation is not from the list or missing, National Grid ESO expects Service Provider to throw 500 Internal ServerError as XSD validation failure.

Other Rejections:

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

9. If File or Window Reason is different to the rejection codes mentioned in the above section, National Grid ESO 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, National Grid ESO can send error codes for different windows in a single availability confirmation xml. National Grid ESO can also send multiple error codes for a single availability window. These error codes will be separated by semicolons.

3.7   Dispatch/Cease Service

VolumeRequested is mandatory only for dispatch instruction. However, National Grid ESO will also send this value inCease instruction. VolumeRequested will always be contracted MW value for the appropriate window.

National Grid ESO will not send '0' MW dispatch instructions.

The same DUI is used for both Dispatch and Cease instruction. At any point in time, there will be only one active DUI per ContractID.

Dispatch instruction will have 'START' and cease instruction will have 'STOP' in the Instruction tag.

The field ScheduledDateTime is not currently used for the STOR, STOR_OPT and STOR_Flexible services and can be ignored.

The cease instruction can be sent by National Grid ESO once the contracts have completed their Minimum Non-Zero Time (MNZT), which includes ramping up and ramping down period of the respective contract. And the next dispatch instruction will be sent only after ramp down time and recovery time is past.

Below are some examples across various scenarios where the exact time after which National Grid ESO can send a cease instruction (**i.e., Ceaseable Time (CT)**)

[Note: Queries on the actual calculations of ceaseable time, they can be addressed by sending an email to box.support.pas@nationalgrid.com]

ITEM	DEFINITION
RUR	Ramp up rate
RDR	Ramp down rate
MWC	MW at which at contract becomes ceaseable
CT	Ceaseable time (i.e., the time at which the MW's can be ceased)
DMW	Dispatched MW
RUP	Ramp up period = MW/RUR
RDP	Ramp down period = MW/RDR
NTS	Notification to Start – Response Time - RUP
Response Time	NTS + RUP

Case 1: MNZT = 0

Suppose, Instruction sent at 10:00, Dispatched MW = 24, Response Time = 12 mins, Ramp up rate = 3. Hence NTS= 4mins

Therefore, instruction will become ceaseable at the end of NTS, at 10:04, however it will appear on the GUI once the dispatch confirmation is received.

Case 2: MNZT < Ramp Up Period [where, **Ramp Up Period** = Dispatched MW / Ramp Up Rate]

In this case the MWs will become ceaseable before they have reached full load. Therefore, the MW at which the contract becomes ceaseable and ceaseable time will be calculated as below.

MWC = MNZT/((1/RUR) + (1/RDR))

CT = MNZT - MWC/RDR

When [Now Time - (Dispatch Time + NTS)] is greater than equal to CT the contract becomes cease able

For example-

Suppose, Instruction sent at 10:00, Dispatched MW = 14, MNZT = 5 mins, RUR = 1.17, RDR = 2, Response Time = 12. Hence NTS will be 0.03.

Therefore, as per calculation CT =3.15, hence instruction will become ceaseable 3.15 mins past 10:00:03 (Dispatch Time + NTS), and when MW is 3.70.

Case 3: MNZT >= Ramp Up Period AND Ramp up period > (MNZT – Ramp Down Period) [where, **Ramp down period** = Dispatched MW / Ramp down rate]

In this scenario, although the MNZT is greater than ramp up period the MW's become ceaseable before the contract has reached full load due to the value of MNZT. Therefore, the MW at which the contract becomes ceaseable and ceaseable time will be calculated as below.

MWC=MNZT/((1/RUR)+(1/RDR))
CT = MNZT - MWC/RDR

When [Now Time - (Dispatch time + NTS)] is greater than equal to CT the contract becomes ceaseable

Suppose, Instruction sent at 10:00, Dispatched MW = 14, MNZT = 15 mins, RUR = 1.17, RDR = 2, Response Time = 12mins. Hence NTS = 0.03.

Therefore, as per calculations, CT = 9.44. Hence, the instruction will become ceaseable 9.44 mins (i.e, 9 mins, ~ 26 secs) past 10:00:03 (Dispatch time + NTS) and when MW is 11.11.

Case 4: MNZT >= Ramp Up Period AND Ramp Up Period <= (MNZT – Ramp Down Period)

In this scenario the MW's become ceaseable once it has reached full load and therefore ramp down would be from Dispatched MW.

CT = MNZT - (DMW/RDR)

Suppose, Instruction sent at 10:00, Dispatched MW = 14, MNZT = 20 mins, RUR = 1.17, RDR = 2, Response Time = 12mins. Hence, NTS = 0.03.
Therefore, as per calculations, CT = 13. Hence, the instruction will become ceaseable 13 mins past 10:00:03 (Dispatch Time + NTS) and when MW is at full load.

Emergency Ceases

Emergency Ceases are cases where National Grid needs a service provider to stop delivering because of issues on the electricity system. This can be triggered in a service provider's minimum run time (Min non zero time) a service provider should accept the emergency cease. In the case of being unable to run ramp down until minimum run time the provider should reject the instruction and start ramping down once minimum run time has been reached.

National Grid will have provision for emergency cease where it will send the cease instruction before minimum non-zero time is past. The DUI will have an 'E-' to indicate it is an emergency cease. i.e. if Service Provider receives a dispatch with a DUI of : 'DIS0931239abc12' an emergency cease would have a DUI of 'E-DIS0931239abc12'.

In the circumstances when Service Provider sends emergency redeclaration and the contract is dispatched, National Grid will send cease instruction irrespective of whether the contract has past the minimum non-zero time. National Grid expects Service Provider to accept this cease instruction.

Manual Cease is to be initiated when there is an emergency at the Service Provider end wherein the ability to emergency redec is not available. Service Provider can call National Grid to initiate the cease which need not honor the minimum non-zero time.

XSD Rejections:

1. If ServiceType is not from the list or missing value, National Grid expects Service Provider to throw 500 Internal Server Error as XSD validation failure.

2. If ContractID is missing, National Grid expects Service Provider to throw 500 Internal Server Error as XSD validation failure.

3. If DUI is missing, National Grid expects Service Provider to throw 500 Internal Server Error as XSD validation failure.

4. If Instruction is different to that of XSD or missing, National Grid expects Service Provider to throw 500 Internal Server Error as XSD validation failure.

5. If DateTimeStamp is missing in the xml, National Grid expects Service Provider to throw 500 Internal Server Error as XSD validation failure.

Error Code Responses:

6. ContractID is not valid, National Grid expects Service Provider to send Dispatch / Cease confirmation response with ERROR in the ResponseCode with the associated Errorcode 'DCS_Error1'.

7. If VolumeRequested is different to the MW Value of the current window, National Grid expects Service Provider to send Dispatch / Cease confirmation response with ERROR in the ResponseCode with the associated Errorcode 'DCS_Error2'.

8. If the absolute difference between National Grid DateTimeStamp and Service provider's current system time (in UTC) is greater than 1 min, National Grid expects Service Provider to send Dispatch / Cease confirmation response with ERROR in the ResponseCode with the associated Errorcode 'DCS_Error3'.

9. If any of the following: VTarget, DroopPercentage, DeadBandPercentage are provided National Grid expects Service Provider to send Dispatch / Cease confirmation response with ERROR in the ResponseCode with the associated Errorcode 'DCS_Error5'.

10. If there is an unspecified error in the Dispatch or Cease message, National Grid expects Service Provider to send Dispatch / Cease confirmation response with ERROR in the ResponseCode with the associated Errorcode 'DCS_Error99'.

In the situation where National Grid did not get a 200 ok response back when the instruction has been sent, National Grid may trigger a manual process to investigate the reason for non-response.

Upon receiving an 'error' response during a dispatch or cease instruction, concerned unit(s) will be marked unavailable in ASDP.

The unit will be marked available again after the cause of receiving an 'error' response has been analyzed by the ASDP Support Team.

3.8   Dispatch / Cease Confirmation Service

If National Grid did not get a confirmation (after receiving a 200 ok response to the dispatch instruction that has been sent by NG) past 120 seconds from the dispatch instruction, it will be assumed that service providers has rejected the instruction.

If National Grid do not get a confirmation (after receiving a 200 ok response to the cease instruction that has been sent by NG) past 120 seconds from the cease instruction, it will be deemed that the Service Provider has ceased the dispatch.

The same DUI should be sent for both Dispatch and Cease instructions. At any point in time, there will be only one active DUI per ContractID.

QDeltaCost and QDelta should not be used for the STOR, STOR_OPT or STOR Flexible Service

XSD Rejections:

1. If ServiceType is missing in the xml, National Grid 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.

2. If ContractID is missing in the xml, National Grid 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.

3. If DUI is missing in the xml, National Grid 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.

4. If Instruction is missing in the xml, National Grid 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

![National Grid ESO logo]

details of the error.

5. If ResponseCode is missing or is not as per the enumeration list as per web service specification, National Grid 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.

6. If DateTimeStamp is missing in the xml, National Grid 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 ContractID is not matching to the dispatch/cease xml payload National Grid has sent, National Grid will reject the confirmation with a non 200 http status code back with a message 'Invalid ContractID' in the response.

2. If Instruction (START or STOP) is not matching to the dispatch/cease xml payload National Grid has sent, National Grid will reject the confirmation with a non 200 http status code back with a message "Unexpected 'STOP' instruction type received" when START is sent in dispatch/cease instruction or "Unexpected 'START' instruction type received" message when STOP is sent in dispatch/cease instruction.

3. If ErrorCode is different to that of the list mentioned in the above section, National Grid will reject the confirmation with a non 200 http status code back with a message 'Invalid ErrorCode' in the response

4. If the absolute difference between Service provider DateTimeStamp and National Grid's current system time (in UTC) is greater than 1 min, National Grid will reject the confirmation with a non 200 http status code back with a message 'Invalid DateTimeStamp' in the response.

5. If DUI is not matching to the dispatch/cease xml payload National Grid has sent, National Grid will reject the confirmation with a non 200 http status code back with a message 'Invalid DUI' in the response.

6. If Dispatch / Cease confirmation is received after 120 seconds, National Grid will reject the confirmation with a non 200 http status code back with a message 'SLA breach' in the response.

3.9   Realtime Metering Service

National Grid expects to get meter readings once every 15 seconds (at 00:00:00, 00:00:15, 00:00:30 and 00:00:45) in every minute. However, to be in line with the contract terms, Service Providers can submit duplicate meter reads for upto a minute. For example, the same meter read value can be provided from 00:00:00 to 00:00:45 but another actual meter read is expected at 00:01:00 and duplicates are acceptable until 00:01:45 and so on.

National Grid expects SPs to provide the average meter reading between the time (e.g. at 00:00:15, take the average of all meter readings between 00:00:00 and 00:00:15)

One meter read should be provided per contract. Sum of all the meter reads attached to the contract should be provided in the meter read.

National Grid expects to receive RTM payloads within 10 sec from the time it is sent from Service Provider. The only required fields for all STOR contracts are; ServiceType, ContractID, DateTimeOfMeterReading, MeterReading, DateTimeStamp, all other fields should not be submitted.

In the event of a service providers RTM failure, National Grid only expects the most current value to be sent at the next 15 second interval and does not expect the RTM readings to be back dated.

As RTM is used by National Grid to gauge the heartbeat of Service Provider's comms, we would consider the contract to be unavailable to dispatch, if:

1. National Grid does not receive any RTM in the last 2 minutes (i.e. 8 for all STOR contracts), RTM NACK will be sent with an error code 'RTM_Error1'.

National Grid will also use this data for operational reporting to Elexon once every half an hour.

The other exceptions are handled as follows. Until the point National Grid gets a valid RTM back, the contract will be unavailable as per the above mentioned logic.

XSD Rejections:

1. If ServiceType is not from the list or missing value, National Grid 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.

2. If ContractID is missing, National Grid 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.

3. If DateTimeOfMeterReading is missing, National Grid 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.

4. If DateTimeStamp is missing, National Grid 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:

5. If MeterReading is missing, National Grid 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.

6. If ContractID value differs to what has been set up in PAS application, National Grid will reject the RTM with a 500 Internal Server Error response back including a message 'Invalid ContractID' in the response.

7. If the absolute time difference between Service Provider DateTimeStamp and National Grid's current system time (in UTC) is greater than 1 min, National Grid ESO will reject the RTM with a 500 Internal Server Error responseback including a message 'Invalid DateTimeStamp' in the response

8. If DateTimeOfMeterReading is not at 00:00:00, 00:00:15, 00:00:30 or 00:0045 in every minute, National Grid ESO will reject the RTM with a 500 Internal Server Error response back including a message 'DateTimeOfMeterReading is not in 15 seconds' in the response.

9. If DateTimeOfMeterReading is after the contract end date, National Grid ESO will reject the RTM with a 500 Internal Server Error response back including a message 'DateTimeOfMeterReading is after Contract end date' in the response.

10. If the absolute difference between DateTimeOfMeterReading and DateTimeStamp is greater than 30 sec, National Grid ESO will reject the RTM with a 500 Internal Server Error response back including a message 'InvalidDateTimeOfMeterReading' in the response.

3.10 Realtime Metering Negative Acknowledgement Service

A Realtime Metering Negative Acknowledgement (NACK) is a message to communicate that we have not received RTM for the last two minutes or there is some issue with the RealTime metering that has been sent and until remedied with correct RTM submissions the contract will be unavailable to dispatch.

Exceptions:

1. If ServiceType is not from the list or missing, National Grid ESO expects Service Provider to throw 500 InternalServer Error as XSD validation failure.

2. If ContractID is missing, National Grid ESO expects Service Provider to throw 500 Internal Server Error as XSDvalidation failure.

3. If ContractID is not valid, National Grid ESO expects Service Provider to send a non 200 http status code back witha message 'Invalid ContractID'.

4. If StartDateTime or EndDateTime is missing, National Grid ESO expects Service Provider to throw 500 Internal Server Error as XSD validation failure.

5. If ErrorCode not in the list as mentioned in the previous section, National Grid ESO expects Service Provider to send a non 200 http status code back with a message 'Invalid ErrorCode'.

6. If DateTimeStamp is missing, National Grid ESO expects Service Provider to throw 500 Internal Server Error as XSDvalidation failure.

7. If the absolute difference between National Grid ESO DateTimeStamp and Service Provider's current system time(in UTC) is greater than 1 min, National Grid ESO expects Service Provider to send a non 200 http status code backwith a message 'Invalid DateTimeStamp'.

3.11 Settlement Metering Service

The settlement meter reads should be submitted for the previous operational day starting from previous day 05:00:00 (local time) to current day 04:59:00 (local time) by the end of the current operational day. For example, by 08 April 2018 at 05:00, National Grid ESO would expect the SPs to submit the meter reads between 05:00:00 on 06 April 2018 to 04:59:00 on 07 April 2018. So, National Grid ESO would expect to see 1440 meter reads every normal day.

Moreover, National Grid ESO expects the settlement meter reads to be submitted by the Service Provide, for a particular contract, after it has started its service term and thereafter should continue sending the meter reads, as per above mentioned rule. For example, if a particular contract is starting its service term from 05:00:00 on 01 April 2021, National Grid ESO would expect the settlement meter reads for the new contract from 03 April 2021 onwards, i.e., by 03 April 2021 at 05:00, the service provider should submit the meter reads for the mentioned contract between 05:00:00 on 01 April 2021 to 04:59:00 on 02 April 2021 and so on.

The meter read should be the average read in a minute. For example, the meter read on 04:30:00 should be the average of meter reads from 04:29:00 to 04:30:00.

Each meter reading should be submitted in a separate meter reading window tag.

XSD Rejections:

1. If ServiceType is not from the list or missing value, National Grid ESO Middleware rejects the same via XSD validation and Service Provider should be getting a 500 Internal Server Error response back. The responsewill also provide the details of the error.

2. If ContractID is missing, National Grid ESO 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.

3. If DateTimeOfMeterReading is missing, National Grid ESO Middleware rejects the same via XSD validation andService Provider should be getting a 500 Internal Server Error response back. The response will also provide the details of the error.

4. If DateTimeStamp is missing, National Grid ESO 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 Responses:

5. If ContractID value differs to what has been set up in PAS application, National Grid ESO will reject the STLM
Payload with synchronous bad request 'Invalid ContractID' as a response.

6. If any DateTimeOfMeterReading is after the contract end date, National Grid ESO will send a Rejection in the
Settlement Metering Confirmation with 'SS_Error4' in the reason field

7. If the absolute difference between Service Provider DateTimeStamp and National Grid ESOs current system time (in UTC) is greater than one-minute National Grid ESO will send Settlement Metering Confirmation rejection with the error code 'SS_Error5'

8. If MeterReading is missing, National Grid ESO will send a Rejection in the Settlement Metering Confirmation
with 'SS_Error6' in the reason field

9. If any minute level metering data is missing in the entire file in an operational day submission, National Grid ESO will reject the entire xml payload and send Rejection in Settlement Metering Confirmation with 'SS_Error7' in the reason field.

10. To accommodate dummy contracts, Service Providers are to provide the metering data in the same settlement metering xml payload using AvailableHeadroom for all 1440 arrays or none. If any minute level AvailableHeadroom is missing in the entire file in an operational day submission, National Grid ESO will reject the entire xml payload and send Rejection in Settlement Metering Confirmation with 'SS_Error8' in the reason field.

11. If there is more than one operational day in the same xml payload, National Grid ESO will reject the entire xml
payload and send Rejection in Settlement Metering Confirmation with 'SS_Error9' in the reason field.

12. If the DateTimeOfMeterReading is in the future, National Grid ESO will reject the entire xml payload and sendRejection in Settlement Metering Confirmation with 'SS_Error10' in the reason field.

13. If an unspecified error occurs, National Grid ESO will send a Rejection in the Settlement Metering Confirmation with 'SS_Error99' in the reason field

There will be manual data validations which are not part of this document.

3.12 Settlement Metering Confirmation Service

The purpose of this web service is to provide an asynchronous response to the Settlement metering submissions. Service provides will receive a Settlement Confirmation message after submitting Settlement metering this will have an 'ACCEPTED' meaning the submission was valid or 'REJECTED' meaning one of the errors mentioned above happened.

In case of multiple errors, the reason will be given separately.

Exceptions:

1. If ServiceType is not from the list or missing, National Grid ESO expects Service Provider to throw 500 InternalServer Error as XSD validation failure.

2. If ContractID is missing, National Grid ESO expects Service Provider to throw 500 Internal Server Error as XSDvalidation failure.

3. If ContractID is not valid, National Grid ESO expects Service Provider to send a non 200 http status code backwith a message 'Invalid ContractID'.

4. If Confirmation is missing or different to the enumerated values, National Grid ESO expects Service Provider to throw 500 Internal Server Error as XSD validation failure.

5. If DateTimeStamp is missing, National Grid ESO expects Service Provider to throw 500 Internal Server Error asXSD validation failure.

6. If the absolute difference between National Grid ESO DateTimeStamp and Service Provider's current system time (in UTC) is greater than 1 min , National Grid ESO expects Service Provider to send a non 200 http statuscode back with a message 'Invalid DateTimeStamp'.

4   Security rules and exceptions

As of Technical Specifications v4.0, National Grid ESO is expecting all the webservices to be authenticated with usernames and passwords. Each Service Provider will have one set of username and password pair i.e. if Service Provider has multiple contracts across any ancillary service types, National Grid ESO will provide a single pair of username and password across all contract ids. If Service Provider sends incorrect username and password or if there is a combination mismatch to the username password to that of contract id in the web services, National Grid ESO will send the appropriate error (will be only 500 error code when sending backend error exception and for XSD validation failure). It is expected for SPs to send the same to NG.

5   Appendix

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