

Response Services Service Terms

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1. Introduction

- 1.1 These **Response Service Terms** describe the requirements for provision of **Response Services** procured by **NESO** under daily **Auctions** and the basis upon which **NESO** shall make payments in respect thereof, and shall apply to each **Service Provider** and **Response Unit** the subject of a **Response Contract** where, in accordance with the **Procurement Rules**, and for any **Response Window** and **Auction Product**, the **Service Provider's Sell Order** for that **Response Unit** is accepted by **NESO**.
- 1.2 Each **Response Contract** so formed shall create a legally binding obligation on the **Service Provider** to provide from the relevant **Response Unit**, and for **NESO** to pay for, the relevant **Auction Product**, to be delivered during the relevant **Contracted Service Period** upon the terms of these **Response Service Terms**. For the avoidance of doubt, neither a **Service Provider** nor **NESO** shall be under any obligation or commitment to provide or pay for an **Auction Product** except pursuant to **Response Contracts**.
- 1.3 A **Response Contract** shall relate to a single **Response Unit** and shall apply only to a single **Response Window** and **Auction Product**.
- 1.4 Neither **Party** may terminate a **Response Contract** once formed except as provided or referred to in paragraph 14 or by agreement in writing between the **Parties**.
- 1.5 These **Response Service Terms** should be read alongside the **Response Procurement Documentation** of which they form a part.

2. Changes to these Response Service Terms

- 2.1 Subject always to paragraph 2.2, **NESO** may update these **Response Service Terms** from time to time by publication of an updated version on its website, and each such updated version shall be effective from the date shown on its front cover provided always that any updated version shall not apply to any **Response Contract** extant at the date of publication except with the consent in writing of the relevant **Service Provider**.
- 2.2 To the extent required by the **Electricity Balancing Regulation** (and by reference to those provisions of the **Response Procurement Documentation** constituting terms and conditions approved by the **Authority** as the terms and conditions related to balancing pursuant to Article 18 of the **Electricity Balancing Regulation**), any variation to these **Response Service Terms** will be proposed and implemented in accordance with the applicable requirements in the **Electricity Balancing Regulation**.

3. Defined Terms

- 3.1 Unless the context otherwise requires, terms used in these **Response Service Terms** shall have the meanings given to each (if any) in:-

3.1.1 Schedule 1;

- 3.1.2 the prevailing **Response Procurement Rules**; and
- 3.1.3 the prevailing **Balancing Services Glossary of General Terms and Rules of Interpretation**.

3.2 Where a term is defined in Schedule 1 and also in either or both of the documents referred to at paragraphs 3.1.2 and 3.1.3, the meaning given in Schedule 1 shall prevail unless the context otherwise requires.

3.3 For the purposes of paragraph 3.1, with respect to any **Response Contract**, “prevailing” shall mean the latest version of the applicable document which is in effect at the time of formation of that **Response Contract**.

4. Interpretation

4.1 The rules of interpretation set out in the **Balancing Services Glossary of General Terms and Rules of Interpretation** shall apply to these **Response Service Terms**.

5. Service Availability

5.1 It is a requirement of each **Response Contract** that, unless prevented by an unplanned outage or other unforeseen technical circumstances, the **Service Provider** will deliver the applicable **Auction Product** by procuring that the relevant **Response Unit** is capable of:-

- i. providing the **Contracted Quantity** at any time during the **Contracted Service Period**; and
- ii. delivering its full **Contracted Response Energy Volume** at any time during the **Contracted Service Period** (subject always to paragraph 5.6 where **Energy Limited**); and
- iii. complying with a **Disarming Instruction** or **Re-Arming Instruction** or with any other requirement of the applicable **Auction Product**,

in each case in accordance with paragraph 6.

5.2 The **Service Provider** shall notify **NESO** (by way of submission of **Operational Data** and **Performance Data** pursuant to paragraphs 15.1 and 15.3 respectively) promptly upon becoming aware of any unavailability of any **Response Unit** (including any component **Eligible Asset**) to provide the applicable **Auction Product** as described in paragraph 5.1, which for the avoidance of doubt where a **Response Unit** is **Energy Limited** and unable to deliver the full **Contracted Response Energy Volume** in the circumstances described in paragraph 5.6 shall not require notification to **NESO** until such time as delivery of the relevant **Auction Product** is no longer possible. In the absence of any such notification, and except as provided in paragraphs 5.7 and 5.9, the applicable **Auction Product** shall be treated as available from the relevant **Response Unit** throughout each **Contracted Service Period**.

5.3 The submission of **Operational Data** and **Performance Data** pursuant to paragraph 15 shall also be used by the **Service Provider** to notify **NESO** promptly when it becomes aware that, following notification pursuant to paragraph 5.2, the

ability of a **Response Unit** to meet the requirements of the applicable **Auction Product** as described in paragraph 5.1 (including, where it is **Energy Limited**, because of its **State of Energy**) has been restored.

5.4 Upon request by **NESO**, any notification pursuant to paragraph 5.2 or 5.3 shall be followed promptly by an explanation in sufficient (but not excessive) detail to enable **NESO** to verify that the **Service Provider's** notification related to unplanned outage or other unforeseen technical circumstances.

5.5 Except as provided in paragraphs 5.6 and 5.8, with effect from the start of the **Settlement Period** in which the **Response Unit** becomes unable to meet the requirements of the relevant **Auction Product** (in whole or part, and whether or not notified by the **Service Provider** pursuant to paragraph 5.2 and until expiry of the **Settlement Period** in which the ability of a **Response Unit** to meet the requirements of such **Auction Product** is restored (or, if later, the time when the **Service Provider** notifies **NESO** that it has been restored), the **Response Unit** shall, for the purposes of paragraph 7, be deemed to be unavailable to deliver the **Auction Product**.

5.6 Where a **Response Unit** which is **Energy Limited** becomes unable to deliver its full **Contracted Response Energy Volume** at any time after commencement of a **Contracted Service Period** solely because of depletion of its **State of Energy**, then provided always that the **Service Provider** has:-

- i. complied at all relevant times with the **State of Energy Management Rules**;
- ii. notified **NESO** in accordance with paragraph 5.2 when the **Response Unit** has finally become unable to deliver the applicable **Auction Product**; and
- iii. used all reasonable endeavours to comply with all and any **Disarming Instructions and Re-Arming Instructions** in accordance with paragraphs 6.16 and/or 6.17 (as the case may be),

the **Response Unit** shall not thereby be deemed unavailable to provide the applicable **Auction Product** and an **Availability Payment** shall be payable pursuant to paragraph 7 (but without prejudice to paragraph 7.3).

5.7 Where either:-

- i. in the absence of notification from the **Service Provider** pursuant to paragraph 5.2, **NESO** nonetheless has reasonable grounds for believing that a **Response Unit** is unable to meet the requirements of the **Response Contract** in all or any part of a **Contracted Service Period**; or
- ii. **NESO** has reasonable grounds for believing that any notification from the **Service Provider** pursuant to paragraph 5.2 is for reasons other than related to an unplanned outage or other unforeseen technical circumstances or the **Response Unit's State of Energy** and/or that the **Service Provider** has deliberately or recklessly failed to comply with the **State of Energy Management Rules**,

then, notwithstanding paragraph 5.6 and for the purposes of paragraph 7, **NESO** reserves the right to treat that **Response Unit** as deemed unavailable to deliver the applicable **Auction Product** for the entirety of the **Contracted Service Period** in question (including any part thereof prior to the commencement of unavailability).

5.8 A **Response Unit** shall not be considered unavailable by reason solely of its inability to comply with a **Disarming Instruction** and/or a **Re-Arming Instruction** (as the case may be) provided always that the **Service Provider** has:-

- i. notified **NESO** of such inability in accordance with paragraph 5.2; and
- ii. used all reasonable endeavours to comply with such instruction in accordance with paragraphs 6.16 and/or 6.17 (as the case may be).

5.9 For the avoidance of doubt, the registration of **Eligible Assets** to a **Response Unit** may not be changed so as to be effective during the subsistence of a **Response Contract**.

6. Service Delivery

6.1 Throughout each **Contracted Service Period**, and except to the extent the **Response Unit** is deemed to be unavailable to deliver the relevant **Auction Product(s)** pursuant to paragraph 5 or is required to comply with a **Disarming Instruction**, the **Service Provider** shall procure the delivery of **Response** in accordance with this paragraph 6.

Operational Baselines

6.2 In relation to each **Settlement Period** falling in each **Contracted Service Period**, the **Service Provider** shall notify **NESO** of an intended operating profile (being a level (which may be zero) of **Output** or **Demand**) for the **Response Unit** (which, where applicable, shall be an aggregate operating profile across all **Eligible Assets**) (the "**Operational Baseline**"), together with confirmation of the associated technical and commercial parameters, in accordance with either paragraph 6.3 or 6.4 (as applicable), and in relation thereto:-

- i. each **Operational Baseline** shall be prepared by the **Service Provider** in accordance with **Good Industry Practice** so as to reflect for the relevant **Response Unit** the **Service Provider's** best estimate of the operating profile of the **Response Unit** in the relevant **Settlement Period**;
- ii. each **Operational Baseline** may be either an integer or a value with up to four (4) decimal places; and
- iii. where the **Response Unit** is **Energy Limited** the **Service Provider** shall comply with the **State of Energy Management Rules**.

6.3 Where the **Response Unit** is **BM Participating**, the **Service Provider** shall confirm its **Operational Baseline** to **NESO** by submission of a **Physical Notification** in accordance with the **Grid Code** (where applicable, rounding up or down to the nearest integer), and shall maintain that **Physical Notification** as at **Gate Closure** (with any subsequent **Bid-Offer Acceptance** adjusting the **Operational Baseline** accordingly), and the **Service Provider** shall further maintain appropriate **Dynamic Parameters** throughout each relevant **Contracted Service Period** to create sufficient headroom and/or footroom for delivery of each **Contracted Quantity(ies)**.

6.4 In relation to each **Response Unit** which is not **BM Participating**, the **Service Provider** shall confirm its **Operational Baseline** to **NESO** by submission of a **Non-BM Data Submission** meeting the requirements of the **ASDP Documentation**.

- 6.5 Where, in respect of any **Settlement Period** in a **Contracted Service Period**, the **Service Provider** has either:-
- i. failed to prepare and submit an **Operational Baseline** for the relevant **Response Unit** in accordance with paragraph 6.2 and (as applicable) paragraphs 6.3 or 6.4; and/or
 - ii. been unable to communicate with **NESO** via **EDL** for ten (10) or more consecutive minutes (where **BM Participating** in relation to the relevant **Response Unit**) or has failed to submit at least two (2) consecutive **Connection Indicators** as required by paragraphs 15.9 and 15.10 (where not **BM Participating** in relation to the relevant **Response Unit**), in either case where not due to any act or omission on the part of **NESO**,
- then for the purposes of paragraphs 5 and 7 that **Response Unit** shall be deemed to be unavailable to deliver the applicable **Auction Product(s)** for the entirety of that **Settlement Period**.
- 6.6 Unless otherwise instructed by **NESO**, for the duration of each **Contracted Service Period**, the **Service Provider** shall operate the **Response Unit** (where applicable at the **Operational Baseline** and with a **State of Energy**) so as to provide, for any **Frequency** deviation, at least the amount of **Response** shown in the relevant table in Schedule 2.
- 6.7 For the purposes of paragraph 6.6:-
- i. **Response** shall be delivered for a continuous period not less than the **Delivery Duration**;
 - ii. for a **Frequency** deviation at a given time differing from the figures shown in Table 3 of Schedule 2, the required levels of **Response** shall be calculated by linear interpolation from the values derived from that Table;
 - iii. for any **Frequency** deviation greater than the greatest **Frequency** deviation given in Table 3 of Schedule 2 (whether positive or negative), the required levels of **Response** shall be calculated by reference to the greatest **frequency** deviation shown (whether positive or negative); and
 - iv. **Response** must not be delivered within the **Deadband** except to the extent that a **Response Unit** which is not **Energy Limited** and which is contracted for **Dynamic Regulation** only is providing equivalent **Mode A Frequency Response** up to the **Contracted Quantity**.

Energy Limited – State of Energy Management Rules

- 6.8 Not Used
- 6.9 Not Used
- 6.10 It shall be the responsibility of each **Service Provider** to manage the **State of Energy** of any **Response Unit** which is **Energy Limited** (and constituent **Eligible Assets** if any) in order to ensure it can meet the requirements of the applicable **Auction Product(s)** and its obligations hereunder.
- 6.11 Without limiting paragraph 6.10, the **Service Provider** shall manage **State of Energy** by adhering to the following rules ("**State of Energy Management Rules**"):

- i. except where permitted in this paragraph 6.11, each **Response Unit** shall operate at all times during a **Contracted Service Period** within a range of **Active Power Output** and/or **Demand** (as the case may be) which enables, for each relevant **Auction Product**, delivery of at least the applicable **Minimum State of Energy Requirement** following any activation of that **Auction Product** at any point during the **Contracted Service Period**;
- ii. for any **Auction Product**, the **Minimum State of Energy Requirement** in the first **Settlement Period** of a **Contracted Service Period** shall be equal to the **Contracted Response Energy Volume**, and for each subsequent **Settlement Period** in that **Contracted Service Period** shall be equal to the **Minimum State of Energy Requirement** calculated for the immediately preceding **Settlement Period** but adjusted (iteratively) as follows:-
 - a. it shall be decreased in correlation with the required delivery volume of that **Auction Product** (or any other **Auction Product** in the same **Product Direction**) activated in the immediately preceding **Settlement Period**; and
 - b. it shall be increased by any **Energy Recovery Adjustment Volume** calculated for that preceding **Settlement Period** but not so as to exceed the **Contracted Response Energy Volume**;
- iii. by way of illustration:
 - a. for a **Response Unit** with a **Contracted Response Energy Volume** of fifty (50) MWh, if in the first **Settlement Period** of the **Contracted Service Period** the **Response Unit** delivered two (2) MWh of export by way of delivery of the relevant **Auction Product** in response to a **Low Frequency** event, its **Minimum State of Energy Requirement** at the start of the second **Settlement Period** would be forty-eight (48) MWh;
 - b. in that same example, where at the start of the second **Settlement Period** the **Minimum State of Energy Requirement** is two (2) MWh below the **Response Unit's Contracted Response Energy Volume**, then (assuming no further intervening **Auction Product** activations or energy recovery) the **Energy Recovery Adjustment Volume** calculated for the fifth **Settlement Period** in that **Contracted Service Period** would be the lower of (1) two (2) MWh and (2) twenty percent (20%) of its **Contracted Response Energy Volume**; and
 - c. in that same example, the **Energy Recovery Adjustment Volume** so calculated for the fifth **Settlement Period** would increase the **Minimum State of Energy Requirement** calculated for the sixth **Settlement Period**;
- iv. for the avoidance of doubt, in the case where, with respect to a **Response Unit**, the **Total LF Contracted Quantity** is not equal to the **Total HF Contracted Quantity**, then the **Minimum State of Energy Requirement** will also be asymmetrical;

- v. without prejudice to the foregoing, the **Service Provider** shall monitor **State of Energy** of the **Response Unit** and take any available action to ensure delivery of at least the applicable **Minimum State of Energy Requirement** throughout the **Contracted Service Period** including by submission of updated **Operational Baselines** for either charging or discharging of the relevant **Response Unit** (as required) to ensure its operation remains within the range of **Active Power Output** and/or **Demand** required by i above;
 - vi. at its discretion, **NESO** may determine that the **Service Provider** should not be treated as having failed to manage **State of Energy** where **System Frequency** is affected by:-
 - a. extended periods of high or low **System Frequency** deviation beyond 0.1 Hz above or below 50Hz; or
 - b. multiple concurrent frequency events; and
 - vii. a **Response Unit** shall not deviate from its **Operational Baseline** (whether in order to manage **State of Energy** or otherwise) whilst **System Frequency** is within the **Deadband** except as provided in paragraph 6.7iv (but for the avoidance of doubt a **Response Unit** providing **Dynamic Regulation** which is not **Energy Limited** may deviate from its **Operational Baseline** whilst **System Frequency** is within the **Deadband** to the extent it is providing equivalent **Mode A Frequency Response** up to the **Contracted Quantity**).
- 6.12 If in the reasonable opinion of **NESO** a **Response Unit** is operating during a **Contracted Service Period** with a **State of Energy** which indicates that the **Service Provider** is not complying with the **State of Energy Management Rules**, then **NESO** reserves the right to treat that **Response Unit** as deemed unavailable to deliver the applicable **Auction Product** for the purposes of paragraphs 5 and 7 until such time as **NESO** is satisfied that the **Service Provider** is in compliance once more.
- 6.13 Nothing in the **State of Energy Management Rules** shall permit or require the deviation by a **Response Unit** from its prevailing **Operational Baseline** or an instruction from **NESO** (including a **Bid-Offer Acceptance**), and accordingly (and for the avoidance of doubt) **State of Energy** shall not be managed by over and/or under delivery including “spilling”.
- Disarming (and Re-Arming) Instructions*
- 6.14 At any time with respect to any **Contracted Service Period**, **NESO** may issue an instruction to the **Service Provider** to cease provision of any one or more of the applicable **Auction Products** (“**Disarming Instruction**”), and such **Disarming Instruction** shall remain effective until such time as **NESO** instructs the **Service Provider** that provision of that **Auction Product(s)** can resume from that **Response Unit** (“**Re-Arming Instruction**”).
- 6.15 All **Disarming Instructions** and **Re-Arming Instructions** shall be given by **NESO** by electronic means, which shall be acknowledged by the **Service Provider** also by electronic means within two (2) minutes of receipt, in each case in accordance with the requirements of the **ASDP Documentation**, and for such purpose ‘disarming codes’ and ‘re-arming codes’ shall be published by **NESO** from time to time.

- 6.16 No later than two (2) minutes following receipt of a **Disarming Instruction** (or, where the **Disarming Instruction** is issued outside of a **Contracted Service Period**, by the start of the next following **Contracted Service Period** if later), the **Service Provider** shall use all reasonable endeavours to disarm the relevant **Response Unit** (and its constituent **Eligible Asset(s)**) such that no **Response** is provided and the **Response Unit** operates in accordance with its then prevailing **Operational Baseline**.
- 6.17 No later than two (2) minutes following receipt of a **Re-Arming Instruction**, the **Service Provider** shall use all reasonable endeavours to re-arm the relevant **Response Unit** (and its constituent **Eligible Asset(s)**) such that provision of the applicable **Auction Product** is either (if the **Re-Arming Instruction** is issued during a **Contracted Service Period**) resumed or (if the **Re-Arming Instruction** is issued outside of a **Contracted Service Period**) begun from the start of that **Contracted Service Period** (or from expiry of such two (2) minute period if later), in each case in accordance with this paragraph 6.
- 6.18 For the purposes of paragraphs 6.16 and 6.17, the **Service Provider** shall be deemed to have used all reasonable endeavours if it is prevented from complying with the **Disarming Instruction** or **Re-Arming Instruction** (as the case may be) due solely to a technical fault of **Plant** or **Apparatus** which could not have been avoided by the exercise of **Good Industry Practice**.
- 6.19 For the purpose of paragraphs 5 and 7 the issue of a **Disarming Instruction** shall not affect payment of the **Availability Payment** during the relevant **Contracted Service Period(s)**.

7. Availability Payments

- 7.1 In respect of each **Response Contract**, and in accordance with paragraph 8, **NESO** shall pay to the **Service Provider** or, (as the case may be), the **Service Provider** shall pay to **NESO**, an **Availability Payment** calculated in accordance with the formulae in Schedule 3.
- 7.2 For the avoidance of doubt, no settlement value shall be calculated pursuant to paragraph 7.1 and the formulae in Schedule 3 in respect of any period or periods of deemed unavailability pursuant to paragraphs 5 or 6.
- 7.3 Without prejudice to its other rights and remedies, **NESO** reserves the right to withhold payment of any **Availability Payment** where the **Service Provider** has failed to provide relevant **Operational Data** and/or **Performance Data** and/or **Connection Indicators** pursuant to paragraph 15.

8. Payment Procedure

- 8.1 In respect of each calendar month during which the **Service Provider** has been party to one or more **Response Contracts**, **NESO** shall send to the **Service Provider** a **Monthly Statement** setting out, in respect of each such **Response Contract**, its calculation of:-
- i. the **Availability Payments** payable to or from the **Service Provider** pursuant to paragraph 7;
 - ii. any adjustments made to previous **Monthly Statements**; and

iii. the resulting net amount due to (or from, as the case may be) the **Service Provider**,

and in respect thereof the provisions of Schedule 4 shall apply.

8.2 The **Monthly Statement** may include in addition to the calculation referred to in paragraph 8.1 details with respect to the settlement of other **Balancing Services** provided by the **Service Provider** during the relevant calendar month.

9. Grid Code and Distribution Code

9.1 The provision by the **Service Provider** of an **Auction Product** shall not relieve it of any of its obligations or affect such obligations (where applicable) set out in the **Grid Code** (including its obligations (if any) to provide **Mode A Frequency Response** when instructed by **NESO** pursuant to the **CUSC** and/or the **Grid Code**) or to provide **Demand** control when instructed by **NESO** pursuant to **Grid Code** OC6) or in the **Distribution Code** of its host **Public Distribution System Operator**.

9.2 Without limiting paragraph 9.1, each **Service Provider** that is or becomes a **DRSC Liable User** shall, for the duration of each **Contracted Service Period**, comply in all respects with the **Demand Response Services Code** as it refers to **Demand Response Active Power Control**.

10. Maintenance of Eligible Assets

The **Service Provider** shall maintain each **Eligible Asset** to such a standard that the **Service Provider** can meet its obligations to provide the applicable **Auction Product** in accordance with each **Response Contract** and these **Response Service Terms**.

11. Third Party Claims

11.1 The **Service Provider** undertakes to **NESO** that the availability and delivery of the applicable **Auction Product** from any **Response Unit** pursuant to and in accordance with each **Response Contract** and these **Response Service Terms** will not at any time during any **Contracted Service Period** cause the **Service Provider** to be in breach of or to otherwise be non-compliant with any **Connection Agreement** and/or any agreement for the supply of electricity or related services to or from any constituent **Eligible Asset** or any **Plant** and **Apparatus** associated with it.

11.2 Notwithstanding paragraph 11.1, in the event that the **Service Provider** delivers the applicable **Auction Product** in accordance with these **Response Service Terms** in consequence of which **NESO** suffers or incurs any loss in respect of a claim brought by any third party related to any actual or alleged breach or non-compliance by the **Service Provider** as described in paragraph 11.1, then the **Service Provider** shall indemnify **NESO** against all and any losses, liabilities, claims, expenses and demands suffered or incurred by **NESO** in connection therewith. Such indemnity shall include any legal costs and expenses reasonably incurred in the contesting of such claims including the court costs and reasonable attorney's fees and other professional advisors' fees. The **Parties** agree and accept that, for the purposes of paragraph 18 all such legal costs and expenses expressed to be the subject of such indemnity shall be treated as direct losses.

- 11.3 In the event of any such claim referred to in paragraph 11.2 being made against **NESO**, **NESO** shall as soon as reasonably practicable give notice of the claim together with all relevant supporting documentation to the **Service Provider**. The **Service Provider** shall be entitled, upon written notice to **NESO** and subject to **NESO** receiving from the **Service Provider** such reasonable undertakings as **NESO** shall reasonably require to protect **NESO** against damage to its name and reputation, to assume at its own expense the sole conduct of all proceedings relating to such claim including the right to contest such claim in the name of **NESO**. **NESO** shall supply the **Service Provider** with all information, assistance and particulars reasonably required by the **Service Provider** in connection therewith. **NESO** shall not accept, settle, pay or compromise any such claim without the prior written approval of the **Service Provider** (not to be unreasonably withheld or delayed). The **Service Provider** shall reimburse to **NESO** all of its reasonable expenses incurred in connection with the provision of any such information, assistance or particulars in the contesting of any such claim.
12. Provision of Other Services
- 12.1 The **Service Provider** undertakes to **NESO** that the availability and delivery of the applicable **Auction Product** from any **Response Unit** pursuant to and in accordance with a **Response Contract** and these **Response Service Terms** will not at any time during any **Contracted Service Period** be impaired or otherwise prejudiced by the **Service Provider's** performance of any agreement with a third party (including another **Service Provider**) relating to any **Eligible Asset** or any associated **Plant** and **Apparatus**, including the making available and/or delivery of services to that third party by the **Service Provider** (whether by way of increases or reductions in **Generation** or **Demand** or stipulated running profiles, participation in any other services (including where part of a trial service) or otherwise, and whether to assist in the management, operation or protection of a **User System** or pursuant to the **Capacity Market Rules** or otherwise).
- 12.2 Notwithstanding paragraph 12.1, and without prejudice to paragraph 12.6, in the event that the **Service Provider** is unable to provide the applicable **Auction Product** (to any extent) in all or any part of any **Contracted Service Period** for any reason described in paragraph 12.1, then the **Service Provider** shall give a full explanation to **NESO** in its notification of unavailability pursuant to paragraph 5.2, and **NESO** may in its absolute discretion (except where paragraph 12.5 applies) terminate the **Response Contract** in question pursuant to paragraph 14).
- 12.3 Subject always to paragraph 12.4, and irrespective of whether or not **NESO** elects to terminate the **Response Contract**, the **Service Provider** hereby agrees to reimburse to **NESO** all and any additional costs and expenses incurred by it as a result of such inability including **NESO's** additional costs of alternative or replacement service provision.
- 12.4 The amount or amounts for which the **Service Provider** may be liable to reimburse **NESO** pursuant to paragraph 12.3 in respect of any single **Response Contract** shall not exceed in aggregate the greater of (1) two hundred and fifty thousand pounds sterling (£250,000), and (2) an amount equal to the aggregate **Availability Payments** in respect of that **Response Contract** calculated by reference to all **Settlement Periods** in the relevant **Contracted Service Period** (ignoring any periods of unavailability and whether or not declared by the **Service Provider**).

12.5 Where, during any one or more **Settlement Periods** in a **Contracted Service Period**, a **Service Provider** is required under the terms of any agreement with **NESO** to provide from any **Eligible Asset** any other **Balancing Service** (except with respect to **Reactive Power**), the **Parties** agree and acknowledge that to the extent that such service provision is inconsistent or in conflict with the delivery of the applicable **Auction Product** (as determined by **NESO**) then the applicable **Auction Product** cannot be provided simultaneously with such other **Balancing Service**. Accordingly, unless pursuant to the terms for provision of and payment for such other **Balancing Services** the relevant **Response Unit** is deemed unavailable to provide the applicable **Auction Product** or except as may otherwise be specified by **NESO**, the relevant **Response Unit** shall be deemed unavailable to provide such other **Balancing Service**, and availability of the **Response Unit** to provide the applicable **Auction Product** pursuant to these **Response Service Terms** shall prevail.

12.6 For the avoidance of doubt, paragraph 12.5 shall not affect:-

- i. the submission by a **Service Provider** of bids and offers (and the issue of **Bid-Offer Acceptances**) under the **Balancing Mechanism** where not made pursuant to terms agreed with **NESO** for provision of any other **Balancing Service**; and
- ii. the simultaneous performance from a single **Response Unit** of multiple **Contracts** (including where formed from the same **Sell Order**) insofar as permitted by the **Response Procurement Rules**.

Further information regarding paragraph 12.6i is contained in the **Stacking Guidance**.

12.7 Where, during any one or more **Settlement Periods** in a **Contracted Service Period**, a **Service Provider** is making available and/or delivering services to a third party in breach of paragraph 12.1, then the relevant **Response Unit** shall be deemed unavailable for the purposes of paragraph 7.

12.8 For the purposes of this paragraph 12, with respect to any **Response Unit** and **Contracted Service Period**, the making available and/or delivery of services by the **Service Provider** to **NESO** or a third party shall be deemed to impair, and be inconsistent or in conflict with, the delivery of the applicable **Auction Product** pursuant to such **Response Contract** where the **Response Unit** is not registered as a **BM Unit** and has a **Contracted Quantity** which is less than the aggregate **Registered Quantity** of each component **Eligible Asset**, unless such excess capacity is demonstrated to **NESO's** reasonable satisfaction to be separately **Metered** so as to enable the production of **Operational Data** and **Performance Data** pursuant to paragraph 15.

13. Communications

13.1 Any communications required by these **Response Service Terms** to be given in writing shall unless otherwise provided in this paragraph 13 be made and deemed to have been received in accordance with paragraph 26 (*Notices*) save as may be otherwise agreed by the **Parties**.

- 13.2 The **Parties** consent to the recording of all telephone conversations between them relating in whole or in part to these **Response Service Terms**, and each **Party** agrees to notify its employees of that consent and obtain their consent to that recording if required by **Law**.
- 13.3 All notifications to be made by the **Service Provider** with respect to any unavailability (and restoration of availability) of a **Response Unit** to provide the applicable **Auction Product(s)** pursuant to paragraph 5 shall be made as part of **Operational Data** using a **Data Concentrator** (unless otherwise provided in paragraph 15).
- 13.4 All **Operational Baselines** prepared by a **Service Provider** pursuant to paragraph 6.2 shall be submitted by the **Service Provider** to **NESO** in accordance with paragraphs 6.3 or 6.4 (as applicable).
14. **Termination of Response Contracts**
- 14.1 Either **Party** shall have the right to terminate a **Response Contract** in the circumstances set out in paragraph 7.1 of the **Flexibility Services Standard Agreement** as if paragraphs 7.1 and 7.2 were set out in full herein.
- 14.2 Without prejudice to paragraph 14.1, and in addition to any other rights of termination available under the **Response Procurement Documentation**, **NESO** may in its absolute discretion terminate a **Response Contract** in respect of a **Response Unit** with immediate effect by notice in writing to the **Service Provider** in the following circumstances:-
- i. where the **Service Provider** is in material breach of a warranty or declaration given as part of the **Registration and Pre-Qualification Procedure** or under any of the **Response Procurement Documentation**;
 - ii. where **NESO** determines that the **Response Unit**, and/or one or more **Eligible Assets** comprising the **Response Unit**, is not ready for commercial operation and/or delivery of the applicable **Auction Product**; or
 - iii. where the **Service Provider** fails to comply in any material respect with its obligations under the **Testing Rules** including where **NESO** determines that the **Service Provider's Independent Technical Expert** is failing to meet the required technical standard and/or is not sufficiently independent (each as defined in the **Testing Rules**).
- 14.3 Paragraphs 7.4 to 7.6 inclusive of the **Flexibility Services Standard Agreement** shall apply as if set out in full herein.
15. **Monitoring and Metering Data**
- Operational data*
- 15.1 To enable **NESO** to verify the **Operational Baseline** and facilitate calculation of **Availability Payments** in accordance with paragraph 7 and Schedule 3, unless and to the extent otherwise directed by **NESO**, the **Service Provider** shall procure and submit to **NESO**, on a continuous basis and with a maximum delay of five (5) seconds, the following data ("**Operational Data**") for each **Response Unit**, all at a granularity of one (1) measurement per second (1 Hz):-

- i. date/time stamp;
- ii. whether or not the **Response Unit** is available for the applicable **Auction Product(s)** pursuant to paragraph 5;
- iii. whether or not the **Response Unit** is the subject of a **Disarming Instruction**;
- iv. **Active Power Output** or **Demand** (as the case may be) shown by **Metered Data**; and
- v. where the **Response Unit** is **Energy Limited**, its **State of Energy** in MWh (**Active Power Output** and **Demand**).

15.2 All **Operational Data** shall be submitted using such means as **NESO** may specify, and shall cover the entirety of each **Contracted Service Period** together also with each **Settlement Period** which falls immediately before and after.

Performance data

15.3 In addition, and without limiting paragraph 15.1, to enable **NESO** to monitor the delivery of **Response** pursuant to a **Response Contract** and to facilitate calculation of **Availability Payments** in accordance with paragraph 7 and Schedule 3, the **Service Provider** shall procure and retain (for a period of not less than three (3) months) the data specified or referred to in paragraph 15.4 ("**Performance Data**") and shall submit the **Performance Data** to **NESO** by electronic transfer on an hourly basis using a **Data Concentrator** throughout the **Contracted Service Period**.

15.4 Unless otherwise specified by **NESO** in writing from time to time, whether or not the **Response Unit** is the subject of a **Disarming Instruction**, the **Performance Data** shall comprise (at a granularity of twenty (20) measurements per second (20 Hz) or alternatively in the case of **Dynamic Regulation** (but only where not **Stacked** with another **Auction Product**), two (2) measurements per second (2 Hz), for each **Response Unit**:-

- i. date/time stamp;
- ii. **Input Frequency** (for one of the relevant **Eligible Assets**);
- iii. whether or not the **Response Unit** is available for the applicable **Auction Product(s)** pursuant to paragraph 5;
- iv. **Active Power Output** or **Demand** (as the case may be) shown by **Metered Data**;
- v. where the **Response Unit** is **Energy Limited**, its **State of Energy** in MWh (**Active Power Output** and **Demand**);
- vi. the **Performance Baseline**, which shall update any **Operational Baseline**, and shall be either an integer or a value with up to four (4) decimal places; and
- vii. the status of the **Response Unit** as either armed or disarmed.

15.5 All **Operational Data** and **Performance Data** to be provided by the **Service Provider** pursuant to this paragraph 15:-

- i. shall be provided where applicable at an aggregate level for each **Response Unit**; and
- ii. shall be to a margin of error of 0.001 Hz for **System Frequency** and one percent (1%) for **Metered Data**.

Publication of data

- 15.6 For the purposes of paragraph 22 (*Confidentiality*) the **Service Provider** consents to **NESO** publishing all **Operational Data** and **Performance Data** on its website in a non-anonymised format.

Delivery Failure Report

- 15.7 Where in relation to any one or more **Settlement Periods** in a **Contracted Service Period** the **Availability Payment** calculated for a **Service Provider** is affected by an active K factor (as more particularly described in Schedule 3), then no later than five (5) **Business Days** following request from **NESO** the **Service Provider** shall provide to **NESO** a report in writing (in such form as **NESO** may reasonably require) setting out in reasonable detail an explanation for the underlying performance of the relevant **Response Unit(s)** attributed to such K factor.

Measurement of frequency

- 15.8 For the purposes of this paragraph 15, the **Parties** agree that **System Frequency** shall be measured in accordance with the **Frequency Measurement Standard**.

Connection Indicator

- 15.9 In addition to **Operational Data** and **Performance Data**, the **Service Provider** shall procure and submit to **NESO**, throughout each **Contracted Service Period** and in relation to each relevant **Response Unit**, a **Connection Indicator** meeting the requirements of paragraph 15.10.

- 15.10 All **Connection Indicators** shall:-

- i. where the **Response Unit** is **BM Participating**, be submitted via **EDL** in accordance with the **Grid Code**; and
- ii. where the **Response Unit** is not **BM Participating**, be submitted at intervals of no more than five (5) minutes and in accordance with the **ASDP Documentation**.

De-registration

- 15.11 Without prejudice to any **relevant** provision of the **Response Procurement Rules**, where the **Service Provider** persistently or materially fails to meet any of its obligations set out in this paragraph 15 (in whole or in part) then **NESO** reserves the right (acting reasonably) to de-register the **Service Provider** as a **Registered Service Provider** and/or a **Registered Response Participant** and/or disqualify any relevant **Eligible Assets** and/or **Response Units** from participating in **Auctions**.

16. **ABSVD**

- 16.1 For the purposes of the **ABSVD Methodology Statement**, the **Service Provider** hereby consents (where applicable for and on behalf of the **Lead Party** of all relevant **BM Units**) to all and any energy volumes associated with delivery of

Response pursuant to a **Response Contract** not being included within the **Applicable Balancing Services Volume Data** save where the **Response Unit** is **BM Participating** (for the avoidance of doubt as a **Primary BM Unit**) in which case energy volumes associated with delivery of **Response** pursuant to each **Response Contract** will be included within the **Applicable Balancing Services Volume Data** (separately, where **Auction Products** are **Stacked**).

17. Force Majeure

17.1 Save for paragraphs 9.2.2 and 9.4 which shall not apply, paragraph 9 of the **Flexibility Services Standard Agreement** shall apply as if set out in full herein.

18. Liability, Indemnity and Insurance

18.1 Paragraph 10 of the **Flexibility Services Standard Agreement** shall apply as if set out in full herein.

19. Records and Audits

19.1 Paragraph 4 of the **Flexibility Services Standard Agreement** shall apply as if set out in full herein.

20. Assignment

20.1 Subject always to paragraph 20.2, paragraph 11 of the **Flexibility Services Standard Agreement** shall apply as if set out in full herein.

20.2 **Response Contracts** may be assigned by the **Service Provider** by way of **Transfer Notices** as specified in, and in accordance with, paragraph 21.

21. Transfer of Response Contracts

21.1 At any time during the subsistence of a **Response Contract**, a **Service Provider** (the "**Primary Service Provider**") may assign to another **Registered Response Participant** (the "**Secondary Service Provider**") all of its rights and obligations under a **Response Contract**.

21.2 The effect of any such assignment once validated by **NESO** pursuant to this paragraph 21 is that all rights and obligations of the **Primary Service Provider** under the **Response Service Terms** with respect to the relevant **Response Contract** shall be transferred to the **Secondary Service Provider**, for the avoidance of doubt for the entirety of the **Contracted Service Period** in question.

21.3 No assignment shall be valid unless:-

- i. both entities are **Registered Response Participants**;
- ii. the **Secondary Service Provider** has **Eligible Assets** which are **Registered** to it and allocated to one or more **Response Units** pursuant to the **Response Procurement Rules** with sufficient aggregate **Registered Quantity** and proven capability to deliver the applicable **Auction Product** to enable the **Response Contract** to be discharged during the applicable **Contracted Service Period**; and

- iii. the assignment is validly notified to **NESO** pursuant to paragraphs 21.4, 21.5 and 21.6 and the **Transfer Notice** validated by **NESO**.

Transfer Notices

- 21.4 Each assignment shall be notified to **NESO** by the **Primary Service Provider** by no later than sixty (60) minutes prior to commencement of the applicable **Contracted Service Period** and in the format designated by **NESO** for such purpose and published on the **Industry Information Website**, and each such assignment is referred to in these **Response Service Terms** as a “**Transfer Notice**”.
- 21.5 Unless otherwise specified in writing by **NESO** from time, each **Transfer Notice** shall comprise the entirety of a **Contracted Service Period**, and shall specify:-
- i. the identity of the **Primary Service Provider** and **Response Unit**; and
 - ii. the identity of the **Secondary Service Provider** and its **Response Unit** and **Eligible Assets**.
- 21.6 Each assignment shall comprise the entire **Contracted Quantity** associated with the **Response Contract**, and for the avoidance of doubt the **Contracted Quantity** shall not be capable of being split amongst two or more **Secondary Service Providers** or two or more **Response Units**.
- 21.7 Each **Transfer Notice** must be signed by or on behalf of both the **Primary Service Provider** and the **Secondary Service Provider**.
- 21.8 Unless deemed withdrawn in accordance with paragraphs 21.9 and 21.10, all **Transfer Notices** properly submitted in accordance with this paragraph 21 shall be automatically accepted by **NESO**.
- 21.9 **Where** in **NESO**'s reasonable opinion the delivery of **Response** pursuant to the **Response Contract** by the **Secondary Service Provider**'s designated **Response Unit** would or might endanger operational security within the meaning of the **Electricity Transmission System Operation Regulation**, then **NESO** shall so notify both **Registered Response Participants** whereupon the **Transfer Notice** shall be deemed withdrawn.
- 21.10 A **Transfer Notice** shall be invalid if the **Secondary Service Provider**'s designated **Response Unit** or any **Eligible Asset** allocated to it is the subject of a **Response Contract** for the same **Contracted Service Period**, in which case **NESO** shall so notify both whereupon the **Transfer Notice** shall be deemed withdrawn.
- 21.11 For the avoidance of doubt, where a **Service Provider** wishes to discharge its obligations to **NESO** with respect to the delivery of the relevant **Response Service** pursuant to a **Response Contract** using an alternative **Response Unit** which it has registered with **NESO** under the **Response Procurement Rules**, it may serve a **Transfer Notice** pursuant to this paragraph 21. With respect to each such **Transfer Notice** validated by **NESO**, **NESO** will monitor availability and submitted parameters, and treat delivery of that **Response Service** from that alternative **Response Unit**, as if made and delivered by the **Service Provider** from its original **Response Unit**, and all references in this paragraph 21 to **Secondary Service Provider** shall be construed as meaning the **Service Provider** where the context admits.

22. Confidentiality

22.1 The provisions of paragraph 12 of the **Flexibility Services Standard Agreement** shall apply to all and any information provided by **NESO** or any **Registered Response Participant** to the other (whether orally or in writing) pursuant to or in connection with these **Response Service Terms** as if set out in full herein.

23. Intellectual Property Rights

23.1 The provisions of paragraph 13 of the **Flexibility Services Standard Agreement** shall apply to all **Intellectual Property Rights** owned by or licensed to either **Party** as if set out in full herein.

24. Data Protection

24.1 The provisions of paragraph 14 of the **Flexibility Services Standard Agreement** shall apply as if set out in full herein.

25. Modern Slavery, Anti-bribery and Living Wage

25.1 The provisions of paragraph 15 of the **Flexibility Services Standard Agreement** shall apply as if set out in full herein, and without limitation as at the date of formation of each **Response Contract** the **Service Provider** warrants, represents and undertakes to **NESO** in the manner set out in paragraph 15.1 thereof and indemnifies **NESO** as provided in paragraphs 15.2 and 15.7 thereof.

25.2 Any breach of this paragraph 25 by the **Service Provider** shall be deemed a material breach of all and any relevant **Response Contracts** for the purposes of paragraph 14.1.

26. Notices

26.1 Save to the extent the manner of communication between the **Parties** is otherwise stipulated in these **Response Service Terms**, paragraph 16 of the **Flexibility Services Standard Agreement** shall apply to any notice required to be submitted under these **Response Service Terms** by either **NESO** or the **Service Provider** to the other as if set out in full herein.

26.2 For the purposes of paragraph 26.1, the relevant contact details and addresses of each **Party** shall be those notified from time to time by that **Party** to the other pursuant to the **Registration and Pre-Qualification Procedure**.

27. Dispute Resolution

27.1 The provisions of paragraph 17 of the **Flexibility Services Standard Agreement** shall apply in relation to any dispute or difference of whatever nature however arising under, out of, or in connection with these **Response Service Terms** as if set out in full herein, save that:-

- i. no **Party** shall have any right to refer any dispute to an **Expert** for determination except where the dispute is stated in these **Response Service Terms** to be referable to an **Expert** for determination or otherwise agreed in writing by the **Parties** to be so referable;

- ii. nothing in this paragraph 27.1 shall prevent the **Parties** from agreeing to resolve any dispute or difference through the courts in which case paragraph 28.2 shall apply; and
- iii. where any dispute is referred to arbitration, the prevailing rules of the **London Court of International Arbitration** shall apply unless otherwise agreed in writing by the **Parties** (and paragraph 17.6 of the **Flexibility Services Standard Agreement** shall be read and construed accordingly).

28. Governing Law and Jurisdiction

- 28.1 Any claim, dispute or matter (whether contractual or non-contractual) arising under or in connection with these **Response Service Terms** or their enforceability shall be governed by and construed in accordance with the laws of England and Wales.
- 28.2 Subject always to paragraph 27.1, **NESO** and each **Service Provider** submits to the exclusive jurisdiction of the courts of England and Wales over any claim, dispute or matter arising under or in connection with these **Response Service Terms** or their enforceability and waives any objection to proceedings being brought in such courts or on the grounds that proceedings have been brought in an inconvenient forum.

29. Severance

- 29.1 The provisions of paragraph 18 of the **Flexibility Services Standard Agreement** shall apply as if set out in full herein.

30. Third Party Rights

- 30.1 The provisions of paragraph 19 of the **Flexibility Services Standard Agreement** shall apply as if set out in full herein with the exception of the words “other than the Distribution and Transmission Licensees (the Company) who shall be entitled to independently enforce all of the terms of the Contract”.

31. No Agency or Partnership

- 31.1 The provisions of paragraph 20 of the **Flexibility Services Standard Agreement** shall apply as if set out in full herein.

32. Waiver

- 32.1 The provisions of paragraph 21 of the **Flexibility Services Standard Agreement** shall apply as if set out in full herein.

33. Entire Agreement

- 33.1 The provisions of paragraph 22 of the **Flexibility Services Standard Agreement** shall apply as if set out in full herein.

34. EMR

- 34.1 Notwithstanding any confidentiality obligations and any restriction on the use or disclosure of information set out in the **Response Procurement Documentation**, the **Services Provider** consents to **NESO** and each of its subsidiaries using all and

any information or data supplied to or acquired by it in any year under or in connection with any **Balancing Services Contract** for the purpose of carrying out its **EMR Functions**.

34.2 For the purposes of this paragraph 34 only:-

- i. **“AF Rules”** has the meaning given to “allocation framework” in section 13(2) of the Energy Act 2013;
- ii. **“Capacity Market Rules”** means the rules created pursuant to section 34 of the Energy Act 2013 as modified from time to time in accordance with The Electricity Capacity Regulations 2014;
- iii. **“EMR Functions”** has the meaning given to “EMR functions” in Chapter 5 of Part 2 of the Energy Act 2013; and
- iv. **“EMR Document”** means The Energy Act 2013, The Electricity Capacity Regulations 2014, the Capacity Market Rules, The Contracts for Difference (Allocation) Regulations 2014, The Contracts for Difference (Electricity Supplier Obligation) Regulations 2014, The Contracts for Difference (Definition of Eligible Generator) Regulations 2014, The Electricity Market Reform (General) Regulations 2014, the AF Rules and any other regulations or instruments made under Chapter 2 (contracts for difference), Chapter 3 (capacity market) or Chapter 4 (investment contracts) of Part 2 of the Energy Act 2013 which are in force from time to time.

SCHEDULE 1 – DEFINED TERMS

“ASDP Documentation”	the prevailing documents published by NESO from time to time entitled “ASR Frequency Response System Set-up for Ancillary Service Provider (DM/DR/DC)” and “ASDP Service Provider – Web Services Specification Version 3”, one or both of which containing the prescribed format content of Non-BM Data Submissions and Connection Indicators from Response Units which are not BM Participating ;
“Auction Product”	a Response Product ;
“Availability Payment”	the Settlement Value for an Auction Product calculated in accordance with Schedule 3;
“Connection Indicator”	a signal in respect of a Response Unit meeting the requirements of paragraphs 15.9 and 15.10;
“Contracted Quantity”	in respect of any Response Unit , Auction Product and Contracted Service Period , the amount of Response (MW) which a Service Provider has agreed to provide as an Auction Product in accordance with a Response Contract ;
“Contracted Response Energy Volume”	in relation to any Response Unit and Contracted Service Period , the volume of stored Active Energy (MWh) (or capability to store energy) that a Response Unit should be capable of delivering before becoming unavailable due to exhaustion (calculated as the sum of the Contracted Quantity multiplied by the Delivery Duration for each Auction Product);
“Contracted Service”	a Response Service the subject of a Response Contract ;
“Contracted Service Period”	a Response Window the subject of a Response Contract ;

“ Data Concentrator ”	a software platform utilised by NESO for the receipt of Operational Data ;
“ Delivery Duration ”	in relation to any Response Unit and Contracted Service Period , the applicable period of time (specified in Schedule 2) over which the Contracted Quantity must be capable of being delivered so as to derive the Contracted Response Energy Volume ;
“ Disarming Instruction ”	shall have the meaning given to it in paragraph 6.14;
“ Dynamic FFR ”	the Balancing Service described as “dynamic Response” in the document entitled “Firm Frequency Response (Dynamic) Tender Rules and Standard Contract Terms Issue #11” as published by NESO from time to time;
“ Energy Limited ”	<p>a classification given in the Registration and Pre-Qualification Procedure to any Auction Unit comprised of one or more Eligible Assets:-</p> <ul style="list-style-type: none"> (a) which creates its store of energy by using power ultimately drawn from the National Electricity Transmission System; and (b) whose State of Energy at the start of a relevant Contracted Service Period is insufficient to provide full delivery of the Contracted Quantity for the duration of that Contracted Service Period;

<p>“Energy Recovery Adjustment Volume”</p>	<p>in relation to any Response Unit which is Energy Limited, an energy volume which, in each Settlement Period following activation of delivery of an Auction Product (“the Post-Activation Settlement Period”), is calculated for the third (3rd) successive Settlement Period which follows it, such volume being the lower of:</p> <p>(1) twenty percent (20%) of the Contracted Response Energy Volume and</p> <p>(2) the difference between:</p> <p>the Contracted Response Energy Volume and</p> <p>the Minimum State of Energy Requirement calculated for such Post-Activation Settlement Period ,</p> <p>but deducting from such difference the aggregate of the Energy Recovery Adjustment Volumes calculated for such Post-Activation Settlement Period and the two (2) Settlement Periods immediately following the Post-Activation Settlement Period;</p>
<p>“Frequency Deviation”</p>	<p>as defined in the CUSC;</p>
<p>“Frequency Measurement Standard”</p>	<p>the prevailing document titled “Frequency Measurement Standard” published by or on behalf of NESO from time to time;</p>
<p>“Grid Supply Point”</p>	<p>as defined in the Grid Code;</p>
<p>“Independent Technical Expert”</p>	<p>an experienced technical expert with expertise in the operation of demand side response (DSR) or generating units or electricity Interconnectors (as the case may be), independent of the prospective Service Provider and engaged by it at its expense to carry out a technical assessment and prepare a test certificate, all as more particularly described in the Testing Rules;</p>

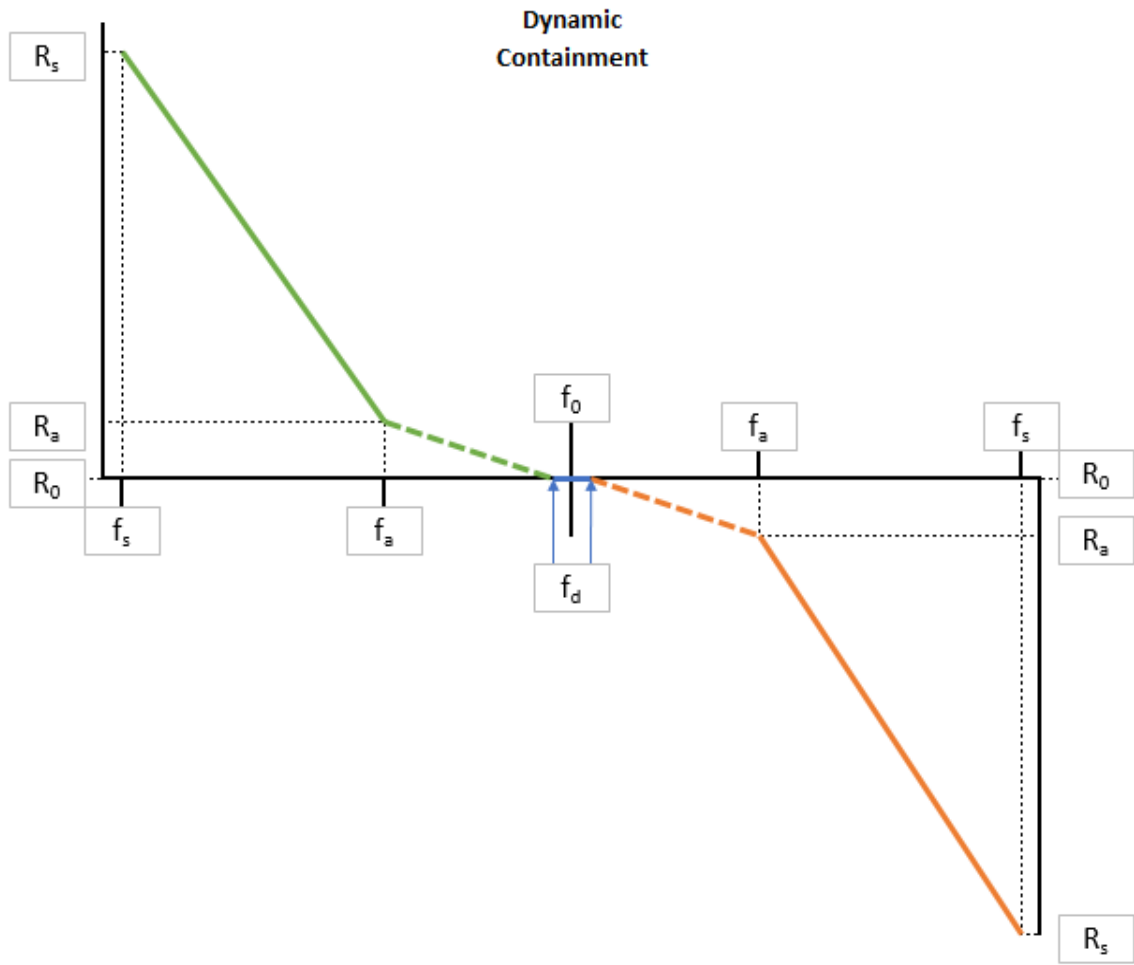
“ Input Frequency ”	the number of alternative current cycles per second (expressed in Hertz) as measured at the grid connection point of the relevant Eligible Asset ;
“ Metered Data ”	data relating to a flow (being either import or export) of Active Energy which is Metered , which may additionally include data derived from any such data pursuant to a methodology which may be approved by NESO for such purpose from time to time;
“ Minimum Adjustment Price ”	one (1) pound sterling per MW per hour (£1/MW/h) or such other price as NESO may from time to time notify in writing to Registered Response Participants for use in the calculation of settlement values pursuant to Schedule 3;
“ Minimum State of Energy Requirement ”	the minimum volume of Active Energy (MWh) that a Response Unit which is Energy Limited shall be capable of either importing or exporting (as the case may be), being a variable amount which is more particularly specified in the State of Energy Management Rules ;
“ Monthly Statement ”	shall have the meaning given to it in paragraph 1 of Schedule 4;
“ Non-BM Data Submission ”	a notification from a Service Provider to NESO giving prevailing operational and other information with respect to a Response Unit as more particularly described in these Response Service Terms ;
“ Operational Baseline ”	shall have the meaning given to it in paragraph 6.2;
“ Operational Data ”	shall have the meaning given to it in paragraph 15.1;

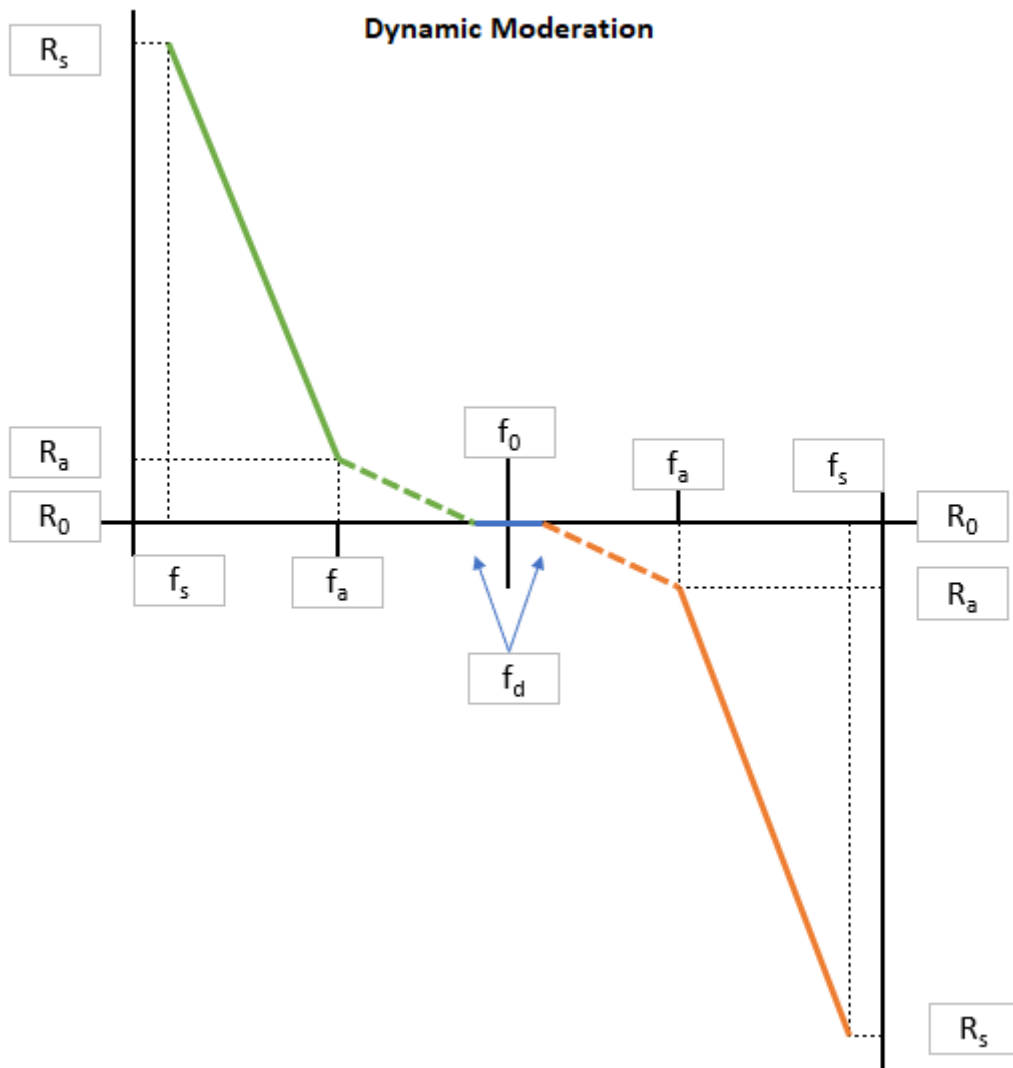
“ Performance Baseline ”	in relation to any Response Unit , the intended operating profile where applicable prior to the delivery of the applicable Auction Product (being a level (which may be zero) of Output or Demand and which, where applicable, shall be an aggregate operating profile across all Eligible Assets);
“ Performance Data ”	shall have the meaning given to it in paragraph 15.4;
“ Primary Service Provider ”	shall have the meaning given to it in paragraph 21.1;
“ Re-Arming Instruction ”	shall have the meaning given to it in paragraph 6.14;
“ Registered Quantity ”	in relation to any Eligible Asset and Auction Product , its Maximum Registered Product Capacity as validated by NESO ;
“ Registered Response Participant ”	a Registered Service Provider who has registered with NESO pursuant to the Registration and Pre-Qualification Procedure as eligible to participate in the procurement of an Auction Product , which shall include acceding to the Response Procurement Documentation ;
“ Registered Service Provider ”	an entity who has submitted the relevant registration documents and to whom NESO has confirmed is subsequently registered as such in each case pursuant to the Registration and Pre-Qualification Procedure ;

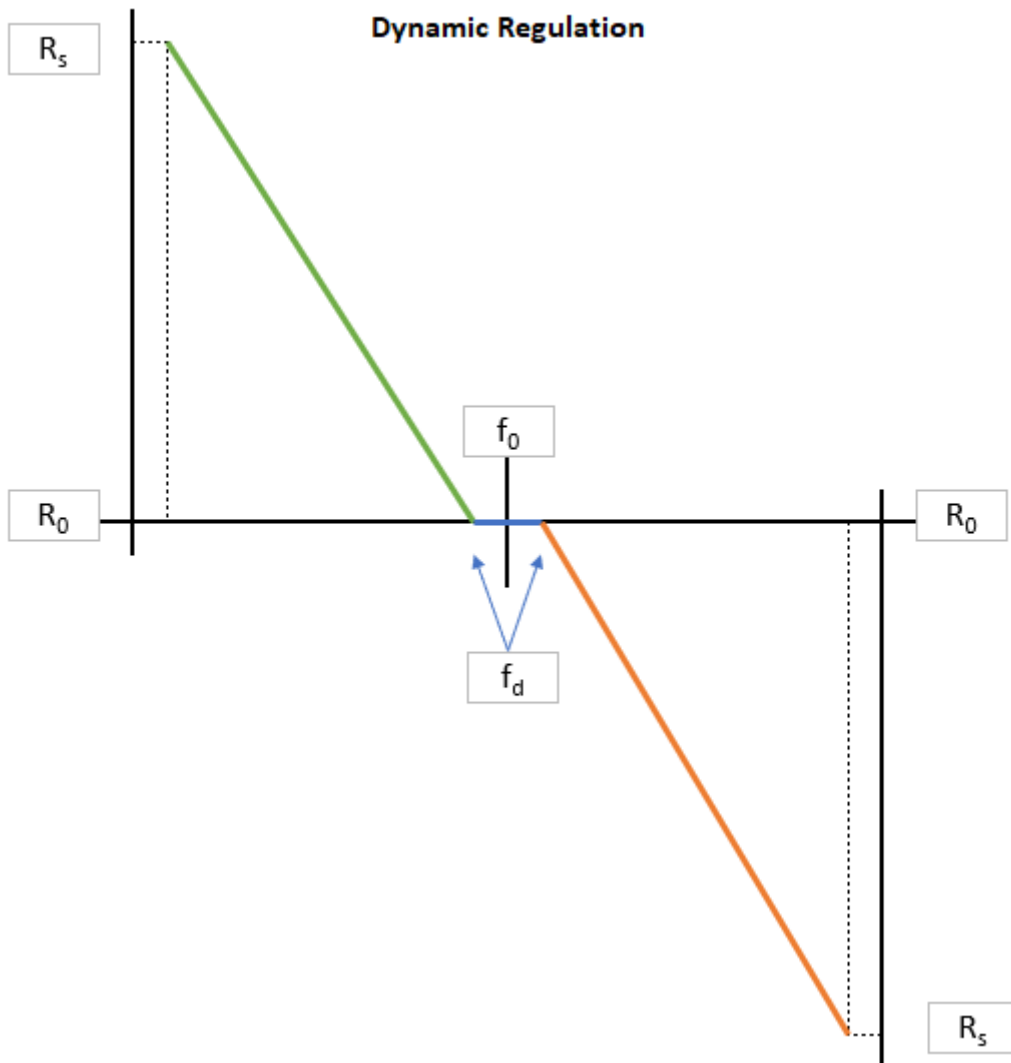
<p>“Response Procurement Documentation”</p>	<p>these Response Service Terms together also with the Response Procurement Rules, the Balancing Services General Terms and Rules of Interpretation, the Common Flexibility Services Standard Agreement (to the extent that any of its provisions are incorporated by any of the other Response Procurement Documentation into such document(s)) and such other document(s) as NESO any designate from time to time as comprising a part of the Response Procurement Documentation;</p>
<p>“Response Procurement Rules”</p>	<p>the prevailing document titled ‘Response Services Procurement Rules’ published by or on behalf of NESO from time to time governing the procurement of Response Services;</p>
<p>“Response Service(s)”</p>	<p>the Auction Products or any of them;</p>
<p>“Response Service Terms”</p>	<p>this document as published by NESO from time to time;</p>
<p>“Response Unit”</p>	<p>an Auction Unit the subject of a Response Contract;</p>
<p>“Secondary Service Provider”</p>	<p>shall have the meaning given to it in paragraph 21.1;</p>
<p>“Service Provider”</p>	<p>with respect to any Response Contract, the applicable Registered Response Participant;</p>
<p>“Stacking Guidance”</p>	<p>the prevailing document titled “Unlocking Stacking of BOAs with Frequency Response Services” published by or on behalf of NESO from time to time setting out the rules for Stacking of Response Services with offers and bids in the Balancing Mechanism;</p>
<p>“State of Energy”</p>	<p>the prevailing state of charge of a battery representing its available Active Power Output and Demand;</p>
<p>“State of Energy Management Rules”</p>	<p>shall have the meaning given to it in paragraph 6.11;</p>

“ Static FFR ”	the Balancing Service described as “Static FFR Service” in the document entitled “Static FFR Procurement Rules” as published by NESO from time to time;
“ Testing Rules ”	the rules for testing Eligible Assets forming part of the Registration and Pre-Qualification Procedure as described in Schedule 5;
“ Total HR Contracted Quantity ”	for any Response Unit and Settlement Period , the sum of the Contracted Quantities of each of DC-high, DM-high and DR-high (which may, for the avoidance of doubt, be zero);
“ Total LF Contracted Quantity ”	for any Response Unit and Settlement Period , the sum of the Contracted Quantities of each of DC-low, DM-low and DR-low (which may, for the avoidance of doubt, be zero); and
“ Transfer Notice ”	shall have the meaning given to it in paragraph 21.4.

SCHEDULE 2 - CAPABILITY DATA TABLES







NOTE: the above assumes no deviation from **Operational Baseline** within the **Deadband**.

Service parameters

The service parameters below are included solely for the interpretation and understanding of the above tables and the formulae in Schedule 3. In the event of any conflict or inconsistency between these service parameters and terminology used or defined elsewhere in the **Response Procurement Documentation**, the former shall prevail.

Parameter	Description	I.D	Value (possible range)			Comment
			DC	DM	DR	
Frequency & delivery quantity parameters						
Nominal frequency	Statutory system frequency for GB	f_n	50 Hz	50 Hz	50 Hz	
Target frequency	System frequency that NESO aims to achieve	f_0	50 Hz	50 Hz	50 Hz	
Deadband frequency range	Frequency range over which the service does not deliver	f_d	$f_0 - 0.015\text{Hz}$ to $f_0 + 0.015\text{Hz}$	$f_0 - 0.015\text{Hz}$ to $f_0 + 0.015\text{Hz}$	$f_0 - 0.015\text{Hz}$ to $f_0 + 0.015\text{Hz}$	This has been specified to align with Article 154, Annex 5 of the System Operator Guidelines (as converted into Retained EU Law). Active power delivery will

Parameter	Description	I.D	Value (possible range)			Comment
			DC	DM	DR	
						commence at f_d
Knee-point frequency	Frequency set point which defines the beginning of the delivery curve	f_a	$f_n \pm 0.2$ Hz	$f_n \pm 0.1$ Hz	not applicable	The knee point describes where delivery of the service begins.
Full delivery frequency (saturation)	Frequency set point at which the service must deliver full contracted quantity ($Q_{contract}(h,l)$)	f_s	$f_n \pm 0.5$ Hz	$f_n \pm 0.2$ Hz	$f_n \pm 0.2$ Hz	At this frequency set point the service must deliver the full contracted quantity.
Quantity at target and Deadband	The percentage amount of $Q_{contract}$ to be delivered at f_0 and f_d	R_0	0 %	0 %	0 %	
Quantity at knee-point	The percentage amount of $Q_{contract}$ to be delivered at f_a	R_a	5%	5%	not applicable	The delivery profile is linear between f_d and f_a

		Value (possible range)				
Parameter	Description	I.D	DC	DM	DR	Comment
Quantity at saturation	The percentage amount of $Q_{contract}$ to be delivered at f_s	R_s	100 %	100 %	100 %	At the full delivery frequency the service must deliver 100 % of the contracted quantity.
Contract quantity parameters						
Contracted quantity	The amount of service that a provider is contracted to deliver. Can be either high or low frequency, or both.	$Q_{contract}(h,l)$	Min 1MW	Min 1MW	Min 1MW	h refers to contracted quantity for high frequency service. l refers to contracted quantity for low service. This is the Contracted Quantity
Contracted LF quantity	The quantity of LF service that a provider is contracted to deliver	P	Min 1MW	Min 1MW	Min 1MW	Is equivalent to $Q_{contract}(l)$

Parameter	Description	I.D	Value (possible range)			Comment
			DC	DM	DR	
Contracted HF quantity	The quantity of HF service that a provider is contracted to deliver	Q	Min 1MW	Min 1MW	Min 1MW	Is equivalent to $Q_{\text{contract}}(h)$
Energy limited parameters						
Delivery duration	Time that an energy limited provider must be capable of sustained delivery of $Q_{\text{contract}}(h,l)$	T_{sus}	15 minutes	30 minutes	60 minutes	
Contracted Response Energy Volume	The volume of stored energy required to be delivered before State of Energy management is required to avoid	$V_{\text{maxC}}(h,l)$	$= (T_{\text{sus}} / 60) \times Q_{\text{contract}}$ MWh	$= (T_{\text{sus}} / 60) \times Q_{\text{contract}}$ MWh	$= (T_{\text{sus}} / 60) \times Q_{\text{contract}}$ MWh	This is NOT the maximum energy volume that could be delivered over the duration of a Contracted Service Period .

Parameter	Description	I.D	Value (possible range)			Comment
			DC	DM	DR	
	unavailability					
Energy recovery	The minimum volume of energy recovery possible (by submission of Operational Baseline) in a single settlement period. As a percentage of $V_{\max C(h,l)}$	$V_{\text{rec}(h,l)}$	20%	20%	20%	Applicable only to energy limited providers. This equates to 3 minutes of energy when T_{sus} is 15 minutes.
Response delivery parameters						
Max initiation time	The maximum time between a change in frequency and change in the delivery of response	T_{iMAX}	0.5 s	0.5 s	2 s (or 0.5 s when Stacked with DC and/or DM)	The provider must begin their response to a change in frequency between 0 s and T_{iMAX} after the

Parameter	Description	I.D	Value (possible range)			Comment
			DC	DM	DR	
						deviation occurred.
Max time to full delivery	The maximum time between frequency deviation occurring and delivery of the saturation quantity (R_s)	T_{dMAX}	1 s	1 s	10 s (or 1s when stacked with DC and/or DM)	For a change in frequency that requires a change in response from 0 to R_s , this is the maximum time it should take.
Lag upper bound tolerance	Maximum initiation time tolerance		0.05 s	0.05 s	Not applicable	
Ramp time upper bound	The upper time bound of start of delivery to delivery of full contracted quantity	tr_{max}	0.5 s	0.5 s	8 s	Equivalent to $(T_{dMAX} - T_{iMAX})$. If the provider initiates response at latest possible

Parameter	Description	I.D	Value (possible range)			Comment
			DC	DM	DR	
						time, this is the longest duration that a response unit can reach saturation quantity (R_s) output after initiation at the max initiation time.
Error tolerance for full payment	The response error up to and including where no performance payment penalties are applied.	A	0.03	0.03	0.05 (or 0.03 when Stacked with DC and/or DM)	For DC and DM, this is an error of 3% of contracted quantity. See Schedule 3.
Error limit for zero payment	The response error at and above which performance	B	0.07	0.07	0.25 (or 0.07 when Stacked with DC and/or DM)	For DC and DM, this is an error of 7% of contracted quantity

Parameter	Description	I.D	Value (possible range)			Comment
			DC	DM	DR	
	payment penalties are 100%.					(with linear interpolation of penalties between 3% and 7%) See Schedule 3.
Grace Period for change between Response Contracts						
Grace period 1	After a response unit begins delivery, after a period of missing data, or after switching from unavailable to available		0.55 s	0.55 s	2 s (of 0.55 s when Stacked with DC and/or DM)	The upper and lower performance bounds will be set to P and - Q respectively
Grace period 2	To allow time to change from one Response		2 s	2 s	10 s (or 2 s when Stacked with DC and/or DM)	The performance bounds will be calculated

Parameter	Description	I.D	Value (possible range)			Comment
			DC	DM	DR	
	Contract (or from Dynamic FFR or Static FFR) to another Response Contract					for 2 seconds after the change using whichever of the contracts gives the lower bound, and the higher upper bound.
Error tolerance	Error tolerance for the scaled error		0.25	0.25	0.25	The performance will be assumed to be 100% during the grace period provided that the scaled error is below 25%.
Rolling minimum window length	Time window length for the rolling minimum error	e_{win}	0.2 s	0.2 s	2 s (or 0.2 s when Stacked with DC and/or DM)	

General dynamic service delivery curve

The service delivery curves for DC, DM and DR are generalised in Table 1.

Table 1: DC, DM and DR delivery curve values vs frequency.

f	DC	DM	DR
49.5	100.00%	100.00%	100.00%
49.8	5.00%	100.00%	100.00%
49.9	2.30%	5.00%	45.95%
49.985	0.00%	0.00%	0.00%
50.015	0.00%	0.00%	0.00%
50.1	-2.30%	-5.00%	-45.95%
50.2	-5.00%	-100.00%	-100.00%
	-		
50.5	100.00%	-100.00%	-100.00%

Calculation of the general delivery curve is described in this section. The general delivery curve is the delivery profile of the **Contracted Service** or the allowed combination of **Contracted Services**.

The general delivery curve depends on the proportion of each quantity of **Contracted Service** to be delivered. The derivation can be achieved by assigning a quantity factor to each of the **Contracted Services** based on the total quantity contracted. The **Contracted Quantity** for each **Contracted Service** is defined as:

$$DC \text{ Low quantity} = Q_{DCL}$$

$$DC \text{ High quantity} = Q_{DCH}$$

$$DM \text{ Low quantity} = Q_{DML}$$

$$DM \text{ High quantity} = Q_{DMH}$$

$$DR \text{ Low quantity} = Q_{DRL}$$

$$DR \text{ High quantity} = Q_{DRH}$$

Then for a **Contracted Service** which is **Stacked**, the total quantity is:

$$Total \text{ Low quantity} = Q_{DCL} + Q_{DML} + Q_{DRL} = TQ_L$$

$$Total \text{ High quantity} = Q_{DCH} + Q_{DMH} + Q_{DRH} = TQ_H$$

Note that for **Response Services** which are not the subject of a **Response Contract**, the corresponding quantities should be set to zero. To derive the general service curve, the factor of each service quantity is calculated in relation to the total quantity:

$$DC \text{ Low service quantity factor} = \frac{Q_{DCL}}{TQ_L} = QF_{DCL}$$

$$DC \text{ High service quantity factor} = \frac{Q_{DCH}}{TQ_H} = QF_{DCH}$$

$$DM \text{ Low service quantity factor} = \frac{Q_{DML}}{TQ_L} = QF_{DML}$$

$$DM \text{ High service quantity factor} = \frac{Q_{DMH}}{TQ_H} = QF_{DMH}$$

$$DR \text{ Low service quantity factor} = \frac{Q_{DRL}}{TQ_L} = Q_{F_{DRL}}$$

$$DR \text{ High service quantity factor} = \frac{Q_{DRH}}{TQ_H} = Q_{F_{DRH}}$$

such that:

$$Q_{F_{DCL}} + Q_{F_{DML}} + Q_{F_{DRL}} = 1$$

$$Q_{F_{DCH}} + Q_{F_{DMH}} + Q_{F_{DRH}} = 1$$

representing the saturation level. Then based on Table 1, the general service delivery curve is derived in Table 2 as a percentage of delivery.

Table 2: General service delivery curve as percentage of delivery

f	DC	DM	DR	General Service
49.50	100%	100%	100%	$(100\% * Q_{F_{DCL}}) + (100\% * Q_{F_{DML}}) + (100\% * Q_{F_{DRL}})$
49.80	5%	100%	100%	$(5\% * Q_{F_{DCL}}) + (100\% * Q_{F_{DML}}) + (100\% * Q_{F_{DRL}})$
49.90	2.30%	5%	45.95%	$(2.3\% * Q_{F_{DCL}}) + (5\% * Q_{F_{DML}}) + (45.95\% * Q_{F_{DRL}})$
49.985	0%	0%	0%	$(0\% * Q_{F_{DCL}}) + (0\% * Q_{F_{DML}}) + (0\% * Q_{F_{DRL}})$
50.015	0%	0%	0%	$-(0\% * Q_{F_{DCH}}) - (0\% * Q_{F_{DMH}}) - (0\% * Q_{F_{DRH}})$
50.10	-2.3%	-5%	-45.95%	$-(2.3\% * Q_{F_{DCH}}) - (5\% * Q_{F_{DMH}}) - (45.95\% * Q_{F_{DRH}})$
50.20	-5%	-100%	-100%	$-(5\% * Q_{F_{DCH}}) - (100\% * Q_{F_{DMH}}) - (100\% * Q_{F_{DRH}})$
50.50	-100%	-100%	-100%	$-(100\% * Q_{F_{DCH}}) - (100\% * Q_{F_{DMH}}) - (100\% * Q_{F_{DRH}})$

Figure 1 shows the general delivery curve for DC,DM and DR **Stacked**. Note that this curve assumes equal contracted quantities across the three **Response Services**.

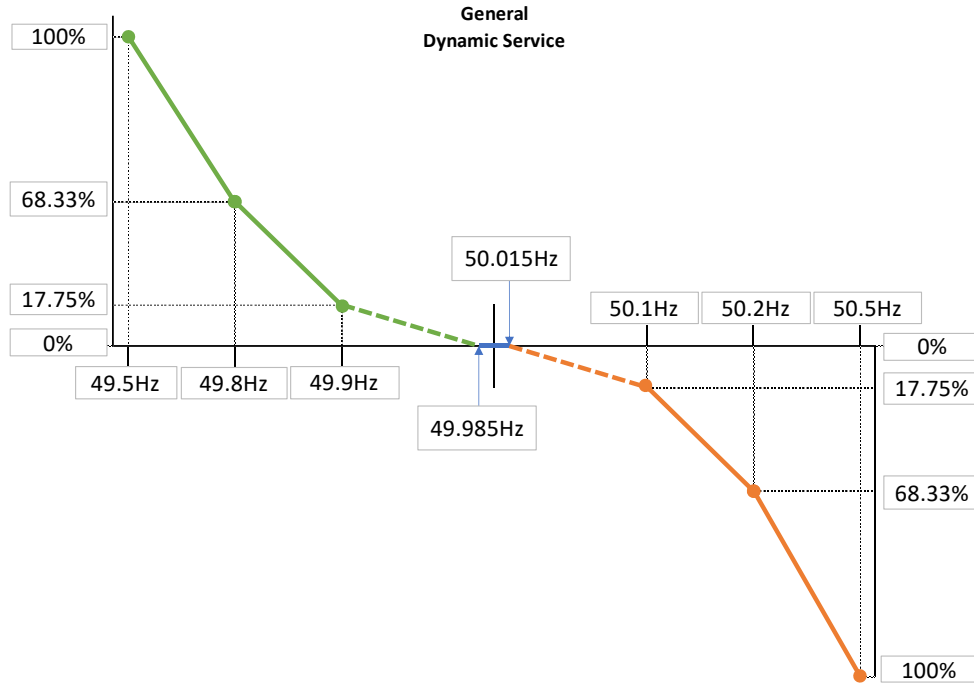


Figure 1: General delivery curve for DC, DM and DR stacked as percentage of delivery.

Table 3 shows the calculation of the general service delivery curve using contracted quantities.

Table 3: Stacked service curve as quantity contracted.

f	General Service
49.50	$TQ_L \times ((100\% \times QF_{DCL}) + (100\% \times QF_{DML}) + (100\% \times QF_{DRL}))$
49.80	$TQ_L \times ((5\% \times QF_{DCL}) + (100\% \times QF_{DML}) + (100\% \times QF_{DRL}))$
49.90	$TQ_L \times ((2.3\% \times QF_{DCL}) + (5\% \times QF_{DML}) + (45.95\% \times QF_{DRL}))$
49.985	0%
50.015	0%
50.10	$TQ_H \times (-(2.3\% \times QF_{DCH}) - (5\% \times QF_{DMH}) - (45.95\% \times QF_{DRH}))$
50.20	$TQ_H \times (-(5\% \times QF_{DCH}) - (100\% \times QF_{DMH}) - (100\% \times QF_{DRH}))$
50.50	$TQ_H \times (-(100\% \times QF_{DCH}) - (100\% \times QF_{DMH}) - (100\% \times QF_{DRH}))$

SCHEDULE 3 – AVAILABILITY PAYMENTS

Calculation of Settlement Value

With respect to each **Response Contract**, a settlement value shall be calculated for each **Settlement Period** in accordance with the following formula:

$$S_{aij} = \text{Round} \left(\left(\left(P_{aj} - \left((1 - K_{aij} \times F_{aij}) \times PF_{aj} \right) \right) \times V_{aij} \times 0.5 \right), 2 \right)$$

Where:

S_{aij} is the settlement value calculated in respect of **Response Unit i** for the relevant **Auction Product a** and **Settlement Period j**;

P_{aj} is the applicable **Market Clearing Price** in £/MW/h for the relevant **Auction Product a** and **Settlement Period j**;

V_{aij} is the **Contracted Quantity** in MW in respect of **Response Unit i** for the relevant **Auction Product a** and **Settlement Period j**;

F_{aij} is zero (0) if **Response Unit i** has any period or periods of unavailability for **Auction Product a** within **Settlement Period j** at or in excess of (either individually or in aggregate over all such periods) 0.1% of the duration of that **Settlement Period**, and is one (1) otherwise;

K_{aij} is the performance factor in respect of **Response Unit i** for the relevant **Auction Product a** and **Settlement Period j**, and is defined in this Schedule 3 below; and

PF_{aj} is the settlement adjustment price in £/MW/h applicable to **Auction Product a** and **Settlement Period j**, and is calculated as follows:

- The settlement adjustment price is equal to the **Market Clearing Price** if the **Market Clearing Price** is greater than or equal to the **Minimum Adjustment Price**;
- The settlement adjustment price is equal to the **Minimum Adjustment Price** if the **Market Clearing Price** is less than the **Minimum Adjustment Price**.

The performance monitoring scheme for each **Auction Product** adjusts the value calculated for a **Settlement Period** by a factor K based on the worst of the performance scores in the **Contracted Service Period** in which the **Settlement Period** falls. Performance scores are described below for each **Auction Product**, calculated using performance bounds to represent valid response delivery. Performance bounds are a pair of time series that enclose possible valid **Auction Product** delivery profiles – this accounts for different lag times and ramp rate between services.

NESO may at its sole discretion (but shall not be obliged to) ignore a performance score when determining factor K in the calculation of the settlement value for any particular **Contracted Service Period**:-

- (i) where the **Response Unit** in question is **Energy Limited**, and the performance monitoring error in question arose due to inadequate **State of Energy** in circumstances where the **Service Provider** was compliant in all respects with the **State of Energy Management Rules**; or
- (ii) where that **Contracted Service Period** falls in a 'grace period' to which **NESO** has given its prior agreement in writing (which shall not exceed fourteen (14) consecutive days) to recognise on-boarding by the relevant **Service Provider** of control systems and other IS interfaces necessary for the delivery and monitoring of the applicable **Auction Product**.

Metered response is derived from **Operational Data** and **Performance Data** for the relevant **Response Unit** obtained by **NESO** pursuant to paragraph 15 of these **Response Service Terms**.

DETERMINATION OF K FACTOR

Response Curve

The **General Dynamic Service** response curve is defined as the linear interpolation between 8 pairs of frequency and response % delivery.

Saturation	$f_{S\pm} = f_0 \pm 0.5 \text{ Hz}$	$R_{S\pm}$
Operation	$f_{O\pm} = f_0 \pm 0.2 \text{ Hz}$	$R_{O\pm}$
Activation	$f_{A\pm} = f_0 \pm 0.1 \text{ Hz}$	$R_{A\pm}$
Delivery/deadband	$f_{D\pm} = f_0 \pm 0.015 \text{ Hz}$	$R_{D\pm}$

R_S, R_O, R_A and R_D are calculated using the column "General Service" of Table 2. The percentage will depend on the total quantity contracted and each individual quantity for each service. The general delivery curve is then defined in Figure 2 below.

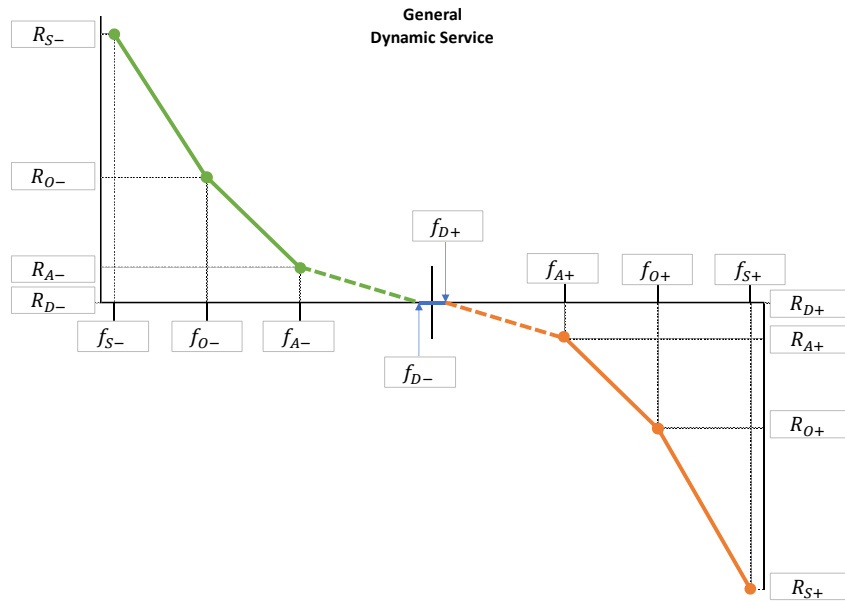


Figure 2: General dynamic service curve.

$$R_{sym}(f) = \begin{cases} R_{S-} & : f < f_{S-} \\ R_{O-} + \frac{R_{S-} - R_{O-}}{f_{S-} - f_{O-}} \times (f - f_{O-}) & : f_{S-} \leq f < f_{O-} \\ R_{A-} + \frac{R_{O-} - R_{A-}}{f_{O-} - f_{A-}} \times (f - f_{A-}) & : f_{O-} \leq f < f_{A-} \\ \frac{R_{A-}}{f_{A-} - f_{D-}} \times (f - f_{D-}) & : f_{A-} \leq f < f_{D-} \\ 0 & : f_{D-} \leq f < f_{D+} \\ \frac{R_{A+}}{f_{A+} - f_{D+}} \times (f - f_{D+}) & : f_{D+} \leq f < f_{A+} \\ R_{A+} + \frac{R_{O+} - R_{A+}}{f_{O+} - f_{A+}} \times (f - f_{A+}) & : f_{A+} \leq f < f_{O+} \\ R_{O+} + \frac{R_{S+} - R_{O+}}{f_{S+} - f_{O+}} \times (f - f_{O+}) & : f_{O+} \leq f < f_{S+} \\ R_{S+} & : f_{S+} \leq f \end{cases}$$

These are the equations for LF and HF only response curves.

$$R_{LF}(f) = \begin{cases} R_{S-} & : f < f_{S-} \\ R_{O-} + \frac{R_{S-} - R_{O-}}{f_{S-} - f_{O-}} \times (f - f_{O-}) & : f_{S-} \leq f < f_{O-} \\ R_{A-} + \frac{R_{O-} - R_{A-}}{f_{O-} - f_{A-}} \times (f - f_{A-}) & : f_{O-} \leq f < f_{A-} \\ \frac{R_{A-}}{f_{A-} - f_{D-}} \times (f - f_{D-}) & : f_{A-} \leq f < f_{D-} \\ 0 & : f_{D-} \leq f \end{cases}$$

$$R_{HF}(f) = \begin{cases} 0 & : f < f_{D+} \\ \frac{R_{A+}}{f_{A+} - f_{D+}} \times (f - f_{D+}) & : f_{D+} \leq f < f_{A+} \\ R_{A+} + \frac{R_{O+} - R_{A+}}{f_{O+} - f_{A+}} \times (f - f_{A+}) & : f_{A+} \leq f < f_{O+} \\ R_{O+} + \frac{R_{S+} - R_{O+}}{f_{S+} - f_{O+}} \times (f - f_{O+}) & : f_{O+} \leq f < f_{S+} \\ R_{S+} & : f_{S+} \leq f \end{cases}$$

Lags and ramp limits

The parameters for lags and ramp limits will be defined by the fastest service of the **Contracted Services**.

	Stacked Service Parameters	Units
Max time to full delivery (T_{dMAX})	$\min(T_{dMAX_service1}, T_{dMAX_service2}, T_{dMAX_service3})$	s
Lag upper bound (T_{iMAX})	$\min(T_{iMAX_service1}, T_{iMAX_service2}, T_{iMAX_service3})$	s
Ramp time upper bound (tr_{max})	$\min(tr_{max_service1}, tr_{max_service2}, tr_{max_service3})$	s
Ramp rate (rr_{min})	$\max(rr_{min_service1}, rr_{min_service2}, rr_{min_service3})$	1/s

Performance bounds definition

Frequency bounds

The frequency bounds are used in the definition of the performance bounds. The upper and lower frequency bounds describe the highest and lowest frequencies that can be found within the lag window.

Upper frequency band at time t :

$$F^{upper}(t) = \max_{0 \leq t_{lag} \leq T_{iMAX} + tol_{iMAX}} f(t - t_{lag})$$

Lower frequency band at time t :

$$F^{lower}(t) = \min_{0 \leq t_{lag} \leq T_{iMAX} + tol_{iMAX}} f(t - t_{lag})$$

Where $f(t)$ is the **Input Frequency** at time t .

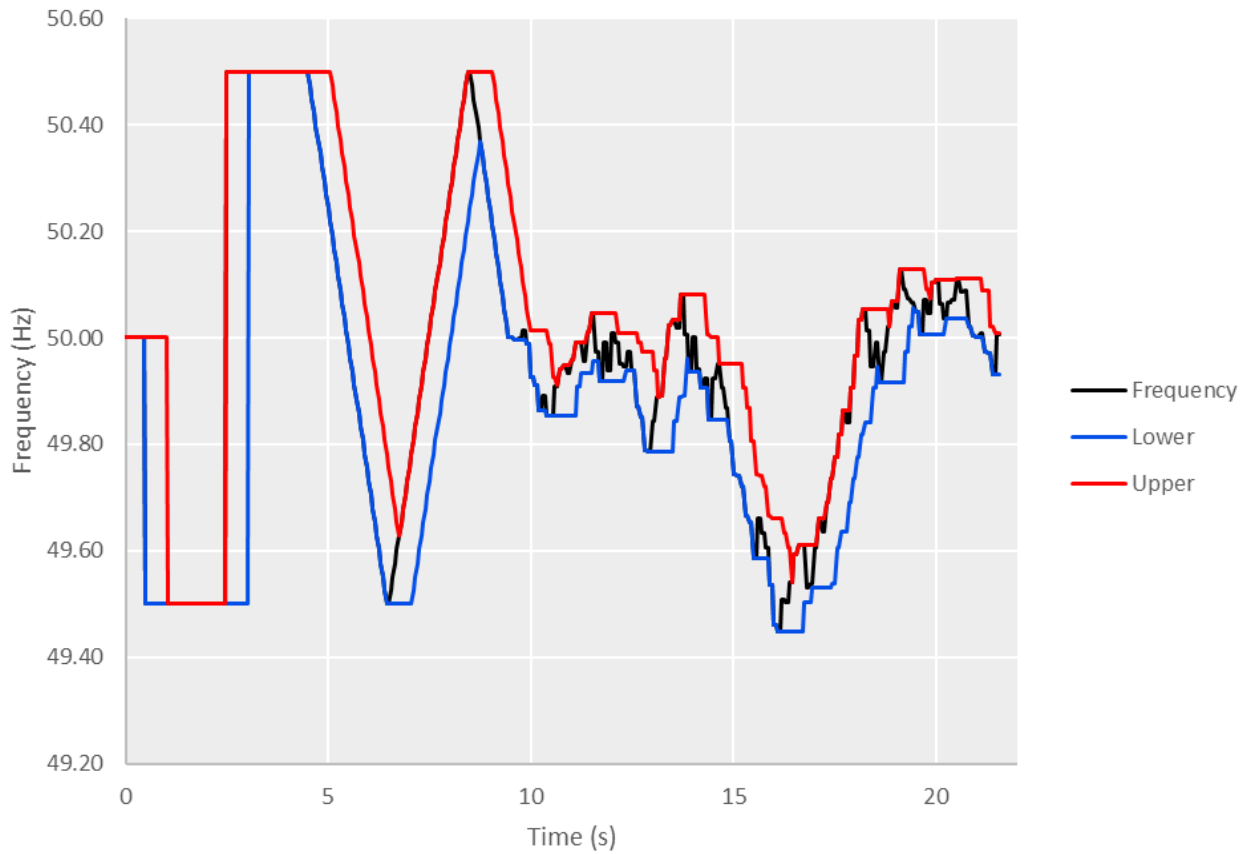


Figure 3: Example of frequency bounds calculation

Ramp limits

Ramp limits are applied to the response curves used in the calculation of the performance bounds. The ramp limits are defined as limits to the rate of change of response.

Upwards ramp limit for function $R(t)$ with ramp limit r :

$$RLU(R(t), r) = \begin{cases} RLU_{prev} + r \times \Delta t & R(t) > RLU_{prev} + r \times \Delta t \\ R(t) & \text{otherwise} \end{cases}$$

Where $RLU_{prev} = RLU(R(t - \Delta t), r)$

Downwards ramp limit for function $R(t)$ with ramp limit r :

$$RLD(R(t), r) = \begin{cases} RLD_{prev} - r \times \Delta t & R(t) < RLD_{prev} - r \times \Delta t \\ R(t) & \text{otherwise} \end{cases}$$

Where $RLD_{prev} = RLD(R(t - \Delta t), r)$.

Performance bounds

The upper bound $UB(t)$ is the response curve applied to the lower lagged frequency, with the ramp limit applied when decreasing.

The lower bound $LB(t)$ is the response curve applied to the upper lagged frequency, with the ramp limit applied when increasing.

After a **Response Unit** begins delivery or after a period of missing data, the upper and lower performance bounds will be set to P and -Q respectively for the duration of **Grace period 1** of the corresponding **Contracted Service**. Furthermore, after switching from unavailable to available the upper and lower performance bounds will be set to P and 0 for low frequency services, and to 0 and -Q for high frequency services, respectively for the duration of **Grace period 1** of the corresponding **Contracted Service**.

To allow time to change between **Response Contracts**, the performance bounds will be calculated for the duration of **Grace period 2** (of the corresponding **Contracted Service**) after the change using whichever of the **Response Contracts** gives the lower bound, and the higher upper bound. The performance will be assumed to be 100% during such grace period provided that the scaled error is below 25%.

Note that for **Stacked** services, the shortest grace period will apply.

Performance bounds for LF only

$$UB_{LF}(t) = RLD \left(R_{LF}(F^{lower}(t)), rr_{min} \right) \times TV_L$$

$$LB_{LF}(t) = RLU \left(R_{LF}(F^{upper}(t)), rr_{min} \right) \times TV_L$$

Performance bounds for HF only

$$UB_{HF}(t) = RLD \left(R_{HF}(F^{lower}(t)), rr_{min} \right) \times TV_H$$

$$LB_{HF}(t) = RLU \left(R_{HF}(F^{upper}(t)), rr_{min} \right) \times TV_H$$

Performance bounds for LF and HF

$$UB(t) = ub(t) \times \begin{cases} TV_L & ub(t) \geq 0 \\ TV_H & ub(t) < 0 \end{cases}$$

$$LB(t) = lb(t) \times \begin{cases} TV_L & lb(t) \geq 0 \\ TV_H & lb(t) < 0 \end{cases}$$

Where:

$$ub(t) = RLD \left(R_{sym} \left(F^{lower}(t) \right), rr_{min} \right)$$

$$lb(t) = RLU \left(R_{sym} \left(F^{upper}(t) \right), rr_{min} \right)$$

Error calculation

The performance monitoring error is zero if the metered response is between the upper and lower performance bounds and is otherwise the difference between the metered response and the closer of the performance bounds.

Error for LF-only

The LF error $e_{m_{LF}}$ for one time measurement and metered response MR :

$$e_{m_{LF}} = \begin{cases} LB_{LF} - MR & MR < LB_{LF} \\ 0 & LB_{LF} \leq MR \leq UB_{LF} \\ MR - UB_{LF} & MR > UB_{LF} \end{cases}$$

Scaled LF error $es_{m_{LF}}$ for one measurement:

$$es_{m_{LF}} = \frac{e_{m_{LF}}}{TV_L}$$

LF Settlement Period error:

$$E_{LF} = \max_{m_{LF}} \left(\text{rolling_minimum}_{\text{over } e_{win} \text{ seconds}} es_{m_{LF}} \right)$$

Note that for **Stacked** services, the shortest rolling window will apply.

Error for HF-only

The HF error $e_{m_{HF}}$ for one time measurement and metered response MR :

$$e_{m_{HF}} = \begin{cases} LB_{HF} - MR & MR < LB_{HF} \\ 0 & LB_{HF} \leq MR \leq UB_{HF} \\ MR - UB_{HF} & MR > UB_{HF} \end{cases}$$

Scaled HF error $es_{m_{HF}}$ for one measurement:

$$es_{m_{HF}} = \frac{e_{m_{HF}}}{TV_H}$$

HF Settlement Period error:

$$E_{HF} = \max_{m_{HF}} \left(\text{rolling_minimum}_{\text{over } e_{win} \text{ seconds}} es_{m_{HF}} \right)$$

Note that for **Stacked** services, the shortest grace period will apply.

Error for Bundled LF and HF

For bundled LF and HF service delivery, performance bounds are calculated using the **Performance bounds for LF and HF** equation resulting in lower bound (LB) and upper bound (UB). To segregate errors into LF and HF errors, the performance bounds are segregated into LF and HF bounds.

For LF errors of bundled service, the UB and LB are calculated as:

$$UB_{LF} = \begin{cases} UB(t) & UB(t) \geq 0 \\ 0 & otherwise \end{cases}$$

$$LB_{LF} = \begin{cases} LB(t) & LB(t) \geq 0 \\ 0 & otherwise \end{cases}$$

For bundled services, the metered response MR for LF is calculated as:

$$MR_{LF} = \begin{cases} MR & MR > 0 \\ 0 & otherwise \end{cases}$$

The LF error e_{m_LF} for one time measurement and metered response MR :

$$e_{m_LF} = \begin{cases} LB_{LF} - MR_{LF} & MR_{LF} < LB_{LF} \\ 0 & LB_{LF} \leq MR_{LF} \leq UB_{LF} \\ MR_{LF} - UB_{LF} & MR_{LF} > UB_{LF} \end{cases}$$

Scaled LF error eS_{m_LF} for one measurement:

$$eS_{m_LF} = \frac{e_{m_LF}}{TV_L}$$

LF Settlement Period error:

$$E_{LF} = \max_{m_LF} \left(\text{rolling_minimum}_{\text{over } e_{win} \text{ seconds}} eS_{m_LF} \right)$$

Note that for **Stacked** services, the shortest grace period will apply.

For HF errors of bundled service, the UB and LB are calculated as:

$$UB_{HF} = \begin{cases} UB(t) & UB(t) < 0 \\ 0 & otherwise \end{cases}$$

$$LB_{HF} = \begin{cases} LB(t) & LB(t) < 0 \\ 0 & otherwise \end{cases}$$

For bundled services, the metered response MR for HF is calculated as:

$$MR_{HF} = \begin{cases} MR & MR < 0 \\ 0 & otherwise \end{cases}$$

The HF error e_{m_HF} for one time measurement and metered response MR :

$$e_{m_HF} = \begin{cases} LB_{HF} - MR_{HF} & MR_{HF} < LB_{HF} \\ 0 & LB_{HF} \leq MR_{HF} \leq UB_{HF} \\ MR_{HF} - UB_{HF} & MR_{HF} > UB_{HF} \end{cases}$$

Scaled HF error eS_{m_HF} for one measurement:

$$eS_{m_HF} = \frac{e_{m_HF}}{TV_H}$$

HF Settlement Period error:

$$E_{HF} = \max_{m_HF} \left(\text{rolling_minimum}_{\text{over } e_{win} \text{ seconds}} eS_{m_HF} \right)$$

Note that for stacked services, the shortest grace period will apply.

K factor calculation

The **Settlement Period** error is used to derive a k factor for each **Settlement Period** of the corresponding **Auction Product**.

Settlement period k factor calculation for LF

For **Settlement Period** j , the Settlement period k factor for LF is:

$$k_{j_LF} = \begin{cases} 1 & E < A \\ 1 - (E_{LF} - A)/(B - A) & A \leq E_{LF} \leq B \\ 0 & E > B \end{cases}$$

Note that for **Stacked** services, the lowest A and B values will apply.

Settlement period k factor calculation for HF

For **Settlement Period** j , the Settlement period k factor for HF is:

$$k_{j_HF} = \begin{cases} 1 & E < A \\ 1 - (E_{HF} - A)/(B - A) & A \leq E_{HF} \leq B \\ 0 & E > B \end{cases}$$

Note that for **Stacked** services, the lowest A and B values will apply.

K factor for the **Contracted Service Period**

The K factor for the **Contracted Service Period** of the corresponding **Auction Product** is then,

K factor for LF:

$$K_{LF} = \min_{j_LF} k_{j_LF}$$

K factor for HF:

$$K_{HF} = \min_{j_HF} k_{j_HF}$$

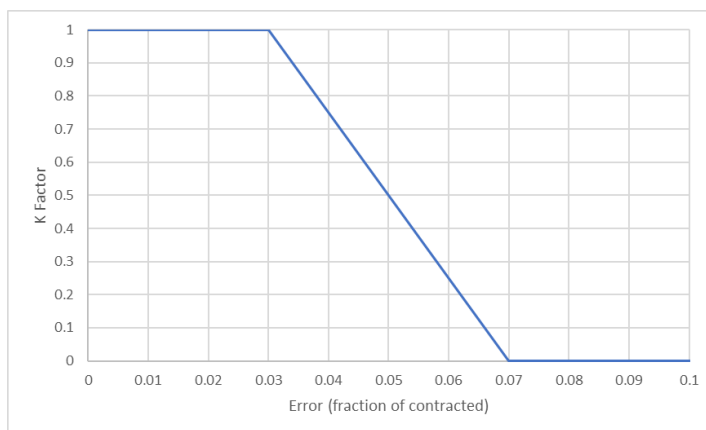


Figure 4: Payment adjustment (K factor) curve for DC and DM.

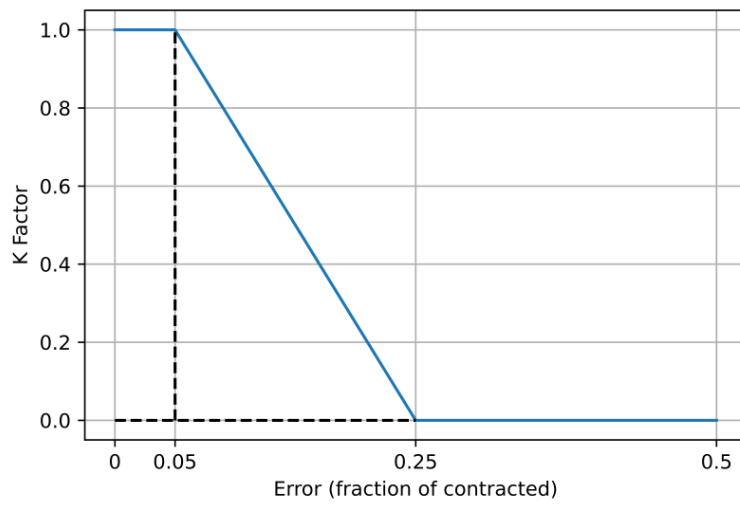


Figure 5: Payment adjustment (K factor) curve for DR.

SCHEDULE 4 - PAYMENT PROVISIONS

Where amounts falling due by or to **NESO** under these **Response Service Terms** are expressed to be payable in accordance with this Schedule 4, then with respect to all and any such amounts the following provisions shall apply.

1. On the eighth (8th) **Business Day** of each calendar month **NESO** shall send to the **Service Provider** a statement (the "**Monthly Statement**") which shall include, for each **Response Contract**, details of the following (to the extent applicable) in respect of the preceding calendar month, together with such other information as may be required to be provided under these **Response Service Terms**:-
 - a. the aggregate number of hours of service provision, together with any **Applicable Balancing Services Volume Data**, with respect to both availability and utilisation (as applicable);
 - b. details of events of default or service failures, and any consequential amounts withheld by or payable to **NESO** with respect thereof;
 - c. the amounts payable by or to **NESO** as a result; and
 - d. in relation to all **Response Contracts**, the total net amount falling due to or from the **Service Provider**.
2. If the **Service Provider** disagrees with the content of any **Monthly Statement**, it may notify **NESO** in writing, with evidence upon which it relies in support of such disagreement, no later than the date falling ten (10) **Business Days** after receipt thereof, but in the absence of any such notification by such date the **Monthly Statement** shall be final and binding on the **Parties** subject only to paragraph 4.
3. Where a disagreement is notified by the **Service Provider** pursuant to paragraph 2, the **Parties** shall discuss and endeavour to resolve the same in good faith, and any revisions to a **Monthly Statement** agreed as a result thereof shall be reflected in a revised **Monthly Statement**, which shall promptly be issued by **NESO**. In the absence of agreement, the **Monthly Statement** shall be binding upon the **Parties** until such time as otherwise agreed in writing between the **Parties** or as may otherwise be determined by an **Expert** following a referral by either **Party** to an **Expert** for determination, and which in each case shall be reflected in a revised **Monthly Statement** which shall promptly be issued by **NESO**.
4. Where, having regard to any **Settlement Run** or to the results of any other monitoring by **NESO** of service delivery, **NESO** or the **Service Provider** discovers that some or all of any calculations and/or amounts falling due shown in any **Monthly Statement** are incorrect, then it shall promptly notify the other in writing whereupon **NESO** shall, at its discretion, revise the **Monthly Statement** and re-issue the same to the **Balancing Service Provider**, and the provisions of paragraphs 2 and 3 shall apply mutatis mutandis to such revised **Monthly Statement**.
5. In the absence of fraud, neither **NESO** nor the **Balancing Service Provider** may invoke the provisions of paragraph 4, with respect to the contents of any **Monthly Statement** (including any revised **Monthly Statement**) after the period of twelve (12) months has elapsed following submission of the original **Monthly Statement** in which the calculations and/or amounts in question were first stated, after which date such calculations and/or amounts shown in the last **Monthly Statement** (including any revised **Monthly Statement**) issued by **NESO** shall be final and conclusive.

6. No later than the eighteenth (18th) **Business Day** of each month, **NESO** will issue a self-billing invoice (or credit note) in accordance with paragraph 11 reflecting the **Monthly Statement** issued pursuant to paragraph 1 (as may have been revised pursuant to the foregoing provisions), and no later than five (5) **Business Days** after such date of issue **NESO** shall pay to the **Service Provider** (or the **Service Provider** shall pay to **NESO**, as the case may be) the net amount shown as due from **NESO** to the **Service Provider** (or from the **Service Provider** to **NESO**, as the case may be) in that **Monthly Statement** (or revised **Monthly Statement**).
7. All payments shall be made in pounds sterling by direct bank transfer or equivalent transfer of immediately available funds to the other **Party's** bank account, details of which shall be as notified by each **Party** to the other from time to time in accordance with these **Response Service Terms**.
8. If by virtue of the foregoing provisions, it is determined or agreed that:-
 - a. the **Service Provider** was entitled to a further payment from **NESO**, then the **Service Provider** shall be entitled to interest at the **Base Rate** on the amount of such further payment from the due date until the date of actual payment; or
 - b. the **Service Provider** was not entitled to any payment it has received, then **NESO** shall be entitled to interest at the **Base Rate** on such amount from the date of payment by **NESO** until the date of repayment by the **Service Provider** (or, as the case may be, until the date when **NESO** makes a payment to the **Service Provider** pursuant to paragraph 6 against which such amount is offset).
9. All amounts specified falling due and payable pursuant to these **Response Service Terms** shall be exclusive of any **Value Added Tax** or other similar tax and **NESO** (or the **Service Provider** where amounts are due to **NESO**) shall the **Value Added Tax** at the rate for the time being and from time to time properly chargeable in respect of the making available and/or provision of the applicable **Auction Product** under these **Response Service Terms**.
10. Sums payable by one **Party** to the other pursuant this Schedule 4 whether by way of charges, interest or otherwise, shall (except to the extent permitted by these **Response Service Terms** or otherwise required by **Law**) be paid in full, free and clear of and without deduction, set-off or deferment in respect of any disputes or claims whatsoever provided that either **Party** shall be entitled to set off any payment due and payable by the other **Party** under this Schedule 4 against any payment it makes to that **Party** under this Schedule 4.
11. For so long as the **Service Provider** is a **Registered Response Participant**, the **Service Provider** agrees that **NESO** shall maintain a self-billing system whereby each **Monthly Statement** shall constitute a self-billing invoice for **VAT** purposes. Accordingly, **NESO** and the **Balancing Service Provider** shall enter into a self-billing agreement in accordance with **VAT** legislation and published guidance from HM Revenue and Customs from time to time, and agree to comply with all relevant requirements in relation to self-billing, and for such purpose the **Service Provider** hereby warrants and undertakes to **NESO** that:-
 - a. it is registered for **VAT** and will inform **NESO** forthwith if its ceases to be so registered or changes its **VAT** registration number;
 - b. it will account to HM Revenue and Customs for the **VAT** paid by **NESO** pursuant to paragraph 9; and
 - c. it will not issue its own **VAT** invoices for provision of the applicable **Auction Product**.

12. The provisions of this Schedule 4 shall survive the termination of any **Response Contract**.