Service Design (draft): real-time Dynamic Response

This document describes the intended structure of the real-time element of the Dynamic Response services (Dynamic Regulation, Dynamic Moderation, Dynamic Containment). It will be implemented as a supplement to the existing service terms and does not supersede them.

Every effort has been made to keep the wording of this document plain and unambiguous to facilitate discussion and feedback on the proposed terms, however it is not a legal instrument and should not be construed as such. Once the design has been finalised, a modified version of the service terms will be produced for review.

Please complete the following survey to provide any feedback on the topics discussed in this draft Service Design:

- https://forms.office.com/r/uc38f4ydAc

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Background and Context

Frequency Management

Frequency response is a broad term for any asset which independently monitors system frequency and adjusts its power export/import accordingly. Procurement of frequency response is a key part of NESO's frequency management strategy.

In the event of a frequency deviation, frequency response providers will automatically counteract the underlying energy imbalance until energy reserves can be instructed. (For more on this, and the frequency standards driving this strategy, see the Frequency Risk and Control Report)

Frequency Services

Most of the frequency response used by NESO is procured in day-ahead auctions, and the services procured at day-ahead are the most secure and cost-effective. However, the quantity of frequency response required to secure the system often cannot be known until long after the auctions have concluded.

In real-time, we can top-up any response shortfalls using Mandatory Frequency Response (MFR). MFR is our oldest frequency response service and was designed for a system with much higher inertia. In today's system, MFR is often ineffective post-fault. Around half of the volume from an MFR unit is reserved for post-fault response, so MFR is also inefficient for pre-fault frequency management. MFR is also non-compliant with market regulations.

It is thus proposed to enhance six of the day-ahead services (Dynamic Regulation High and Low, Dynamic Moderation High and Low, and Dynamic Containment High and Low) to enable them to be procured close to real-time (in addition to the day-ahead procurement).

Service Overview

This is not a new service – rather, it is the addition of a real-time component to the existing Dynamic Response services.

- Providers will submit response capabilities as part of pre-qualification (if they intend to provide the real-time component of the services).
- Providers will submit prices and limits for participation in the real-time services in advance of the delivery period (before or after the day-ahead Dynamic Response auction).
- Providers will notify any unavailability at any point up to real-time.
- NESO will issue instructions to start, and cease, provision of DM, DR or DC (High, Low or both) in real-time (usually, with 2 minutes' notice, but sometimes further out).
- Providers will deliver DM, DR, or DC (High, Low or both) while under instruction.
- NESO will calculate the delivered volumes and settle them accordingly.

- NESO will monitor performance and adjust the settlement accordingly.
- NESO will publish a full set of ranges, prices and instructions.

The existing Dynamic Response service terms will still apply in all other respects.

Optional participation

The new real-time service is an **Optional Service.** This means a service which is offered over a period and may then be utilised for some, all or none of that period. This is as opposed to a firm service which is contracted in advance for a set period and must then be provided for the whole of that period.

- There is no obligation to participate in the service at any time.
- However, when the declaration deadline passes, any unit which has submitted prices or deadlines is then committed to honour that submission.
- Thus a unit still has an obligation to respond to instructions issued in alignment with the declarations they have made in respect of an optional service.

Reading this document

In this document, text highlighted in green is commentary on the reasoning behind design decisions made and does not form part of the proposed design.

In this document, text highlighted in pink identifies alternative options which have been considered but are not, for the time being, part of the proposed design.

Unit Parameters

For BM participants, the capability of a unit to provide response in real-time will be determined partly from their BM parameters:

- Physical Notification (PN): the unit's intended energy profile.
- Maximum Export Limit (MEL): the maximum export the unit can achieve.
- Stable Export Limit (SEL): the minimum export the unit can consistently and safely achieve.
- Maximum Import Limit (MIL): the maximum import the unit can achieve.
- Stable Import Limit (SIL): the minimum import the unit can consistently and safely achieve.

Detailed information on these parameters and their interpretation can be found in the Grid Code section BC1 Appendix 1.

For units managing their MEL and MIL values in line with the "30-minute rule" guidance issued by NESO, updated guidance will be issued prior to the service go-live to ensure there is no conflict with how this service will use the data.

For non-BM participating units, none of these values are currently submitted. Instead:

- Operational baselines (as currently submitted) will be used in place of PN's.
- Values will be recorded (once) as part of the pre-qualification process which be used in place of MEL and MIL (and possibly, if needed, SEL and SIL). These values might well have different names (to be determined), to avoid confusion (since they would not be able to be updated as flexibly as BM parameters).

Alternatively, we could dispense with the concept of capability calculations with non-BM participating units, as they are not subject to the same obligations to participate in real-time balancing as BM units are.

Alternatively, we could provide the capability for non-BM participating units to submit and re-submit time-bound MEL, SEL, MIL and SIL parameters in operational timescales.

Response Capability

The quantity of response that can be offered by a unit in real-time will vary depending on how much headroom or footroom that unit has (i.e., how much capacity for increasing or decreasing its import or export). For some units, this will be a straightforward linear relationship; in other cases it will be more nuanced.

Units will thus be requested to submit capability data as part of pre-qualification for the real-time service. It is expected that this data will change infrequently – for most units, never. This data will be used in real-time by NESO to decide which units to instruct for which services, and post-event to determine settlement payments.

The draft provisions in this section are closely based on the equivalent function in the MFR service.

Operating Level

The term "operating level" (abbreviated to OL) is used in this section of the document to mean the level at which a unit is expected to be operating outwith any frequency response delivery. For a BM unit, this is the unit's PN, plus or minus any accepted BOA's, capped by MEL and collared by MIL. For a non-BM unit, this is simply the unit's operational baseline.

Headroom and Footroom

We use the term **Headroom** to mean the absolute difference, in MW, at a given point in time between the unit's operating level and:

- If the unit's OL is greater than or equal to SEL, or it has a zero SEL and SIL, its MEL, or
- Alternatively, if the unit so chooses, if the unit's OL is greater than or equal to SEL, and it provides a Power Available signal, its current Power Available value, or
- If the unit's OL is less than or equal to SIL, and it has a non-zero SEL or SIL, its SIL.

This concept exists in MFR, where it is referred to as "deload", meaning how far below the unit's maximum output it is generating.

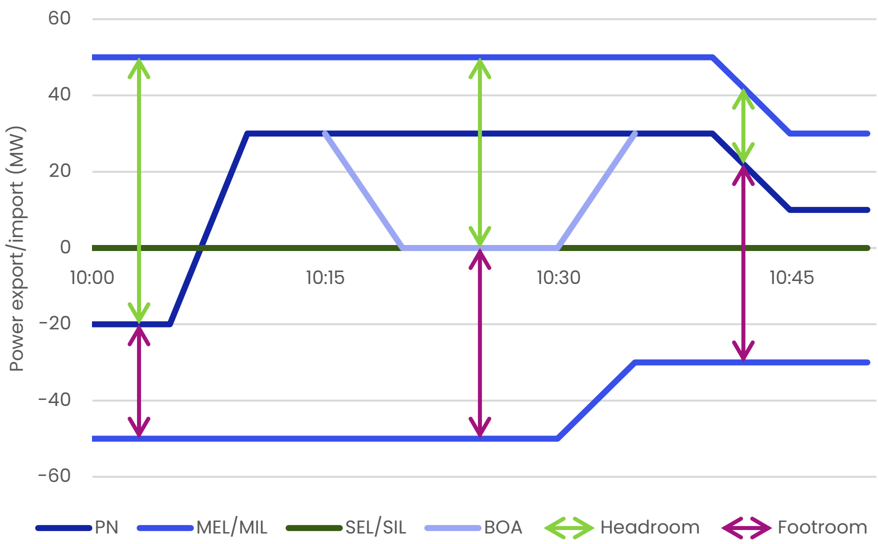
We use the term **Footroom** to mean the absolute difference, in MW, at a given point in time between the unit's operating level and:

- If the unit's OL is greater than or equal to SEL, and has a non-zero SEL or SIL, its SEL, or
- If the unit's OL is less than or equal to SIL, or has a zero SEL and SIL, its MIL.

If the unit has a non-zero SEL and/or SIL, and its OL is between its SEL and SIL, its Headroom and Footroom are both considered equal to zero.

SEL and SIL are the levels past which a unit cannot operate in a stable fashion. Therefore, any unit operating between its SEL and SIL is understood to be in the process of starting up or shutting down and is thus considered unable to provide frequency response.

Examples of headroom and footroom determination:

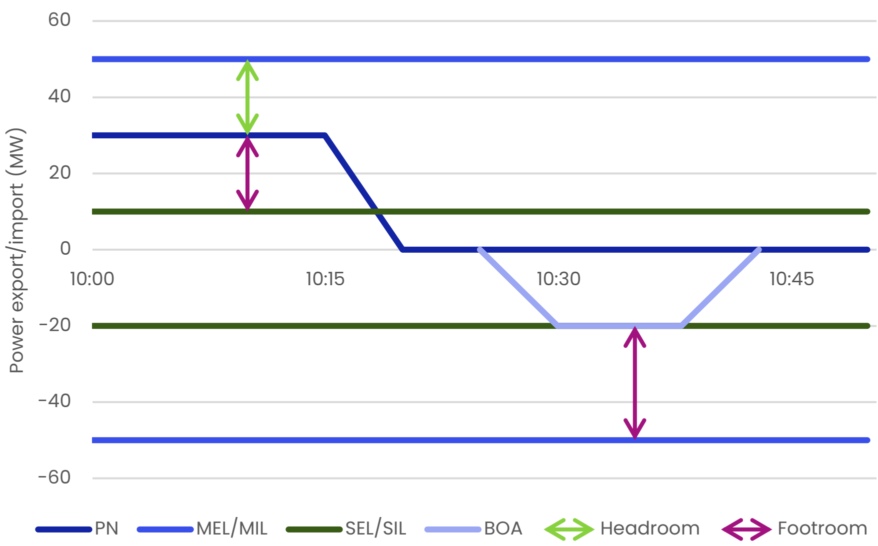


Time 1: The unit is operating below SIL, and both SEL and SIL are zero. Its OL is equal to its PN. Its headroom is the absolute difference between its MEL and OL, which is 70MW. Its footroom is the absolute difference between its MIL and OL, which is 30MW.

Time 2: The unit is operating at SEL, and both SEL and SIL are zero. Its OL is its PN plus the BOA it has received. Its headroom is the absolute difference between its MEL and OL, which is 50MW. Its footroom is the absolute difference between its MIL and OL, which is also 50MW.

Time 3: The unit is operating above SEL, and both SEL and SIL are zero. Its OL is equal to its PN. Its headroom is the absolute difference between its MEL and OL, which is 20MW. Its footroom is the absolute difference between its MIL and OL, which is around 50MW.

Further examples of headroom and footroom determination (with non-zero SEL and SIL):



Time 1: The unit is operating above SEL, and SEL and SIL are not both zero. Its OL is determined by its PN. Its headroom is the absolute difference between its MEL and OL, which is 20MW. Its footroom is the absolute difference between its SEL and OL, which is also 20MW.

Time 2: The unit is operating at SIL, and SEL and SIL are not both zero. Its OL is determined by its PN plus the BOA it has received. Its headroom is the absolute difference between its SIL and OL, which is 0MW. Its footroom is the absolute difference between its MIL and OL, which is 30MW.

Capability Data

Any unit intending to participate in one or more real-time services must submit a table of capabilities, as follows. This submission is to be made as part of the pre-qualification process for that unit.

We expect that many units will have identical data for each of the three low service and for each of the three high services, however we will gather all three separately to avoid any risk of confusion.

Low Frequency Services

Headroom MW:	LF0: 0	LF1:	LF2:	LF3:	LF4:
DRL MW:					
DML MW:					
DCL MW:					

High Frequency Services

Footroom MW:	HF0: 0	HF1:	HF2:	HF3:	HF4:
DRH MW:					
DMH MW:					
DCH MW:					

The provider should complete the table with the response provision capability of their unit at a chosen set of reference points (levels of headroom/footroom). The reference points are to be specified by the provider, in the first row of the table.

This allows the provider to choose points which match the dynamics of their asset. We assume that the unit's capability can be linearly interpolated between the points provided.

Data must be provided for the 0 reference points (it is assumed, but should still be specified, that the available response at these reference points will be 0)

Data must be provided for at least one further reference point (LF1/HF1) and may optionally be provided for another three.

A maximum of five total reference points (including the zero point) was chosen to achieve a balance between accuracy and utility. Sufficient points must be available to enable providers to express their true capability. However, the difficulty of selecting the correct unit for response provision grows geometrically with the number of points provided.

The headroom/footroom levels for the non-zero reference points are to be chosen by the service provider. These should be chosen to give a good indication of the unit's capability and must be monotonically increasing. NESO reserves the right to request an explanation of why certain points have been chosen, and to reject a capability dataset if it does not appear to give a true representation of the unit's full capabilities.

Example of populated capability table:

Low Frequency Services

Headroom MW:	LF0: 0	LF1: 10	LF2: 50	LF3: 100	LF4: -
DRL MW:	0	9	25	40	-
DML MW:	0	9	25	40	-
DCL MW:	0	9	25	40	-

High Frequency Services

Footroom MW:	HF0: 0	HF1: 30	HF2: 100	HF3: -	HF4: -
DRH MW:	0	20	60	-	-
DMH MW:	0	20	60	-	-
DCH MW:	0	20	60	-	-

Interpretation of Data

- Data in the body of the table indicates the available response capability, in MW, that could be provided by the unit while at an operating level with that headroom/footroom.
- The unit's capability at other operating levels will be determined by linear interpolation between the given reference points.
- The unit's capability beyond the final reference point in each table will be determined by linear interpolation from the final two given reference points.

This is based on an assumption that response capabilities are always convex, so that a linear interpolation will slightly underestimate the response available. The onus is then on the service provider to select reference points that will minimise the underestimation.

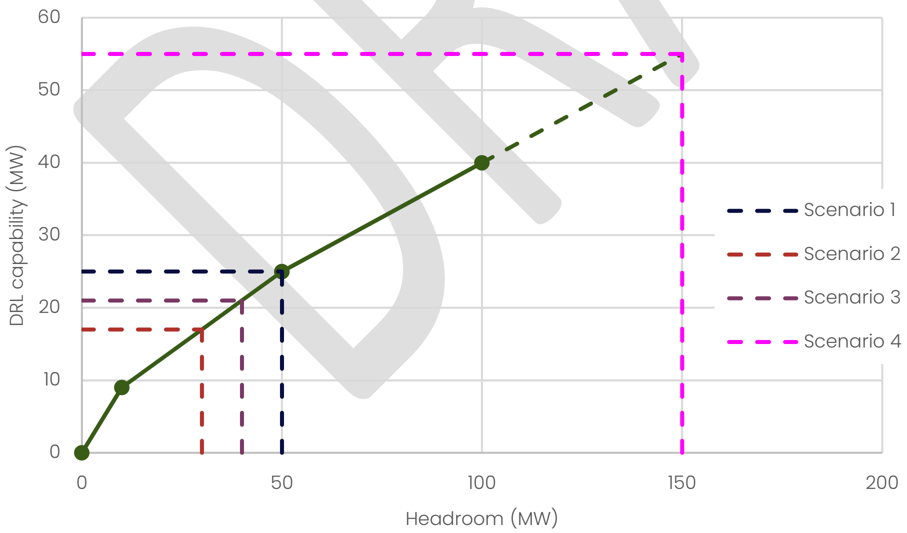
Examples of data interpretation:

Low Frequency Services.

Consider the following row of data from a unit submission, in the following scenarios.

Headroom MW:	LF0: 0	LF1: 10	LF2: 50	LF3: 100	LF4: -
DRL MW:	0	9	25	40	-

1. *The unit is operating at 50 MW, with a MEL of 100 and a SEL of 0. The unit's headroom is 50 MW (determined relative to MEL, as the unit is above SEL), so it has a DRL capability of 25 MW, as per its capability data.*
2. *The unit is operating at 70 MW, with a MEL of 100 and a SEL of 0. The unit's headroom is 30 MW (determined relative to MEL, as the unit is above SEL), so it has a DRL capability of 17 MW, determined by linear interpolation between D1 and D2.*
3. *The unit is operating at -50 MW, with a MEL of 100, MIL of –100, SEL of 10 and SIL of -10. The unit's headroom is 40 MW (determined relative to SIL, as the unit is below SIL and at least one of SEL and SIL is non-zero), so it has a DRL capability of 21 MW, determined by linear interpolation between D1 and D2.*
4. *The unit is operating at -50 MW, with a MEL of 100, MIL of –100, and a SEL and SIL of 0. The unit's headroom is 150 MW (determined relative to MEL, as both SEL and SIL are zero), so it has a DRL capability of 55 MW, determined by linear interpolation from D2 and D3.*

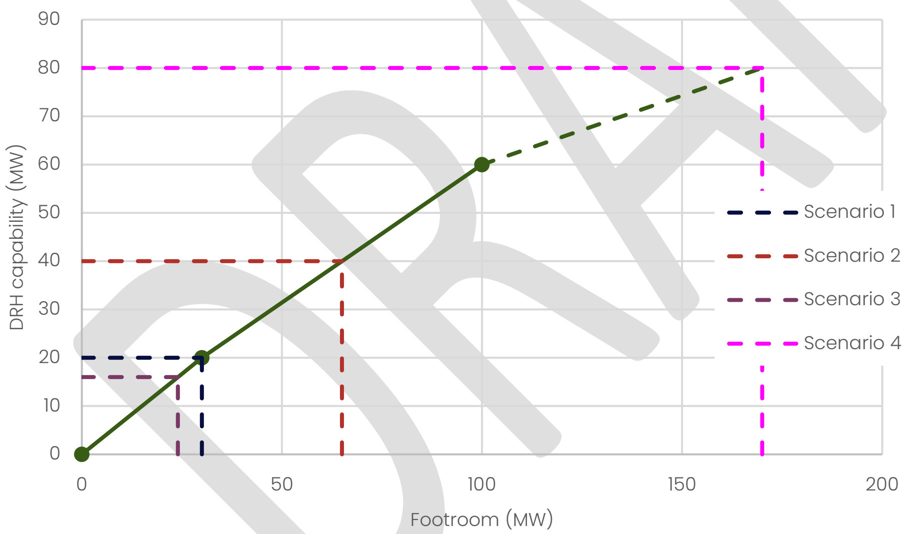


High Frequency Services.

Consider the following row of data from a unit submission, in the following scenarios.

Footroom MW:	HF0: 0	HF1: 30	HF2: 100	HF3: -	HF4: -
DRH MW:	0	20	60	-	-

1. *The unit is operating at 40 MW, with a MEL of 100 and a SEL of 10. The unit's footroom is 30 MW (determined relative to SEL, as the unit is above SEL and the SEL is non-zero), so it has a DRH capability of 20 MW, as per its capability data.*
2. *The unit is operating at 15 MW, with a MEL of 50, MIL of –50, and a SEL and SIL of 0. The unit's footroom is 65 MW (determined relative to MIL in this case, as both SEL and SIL are zero), so it has a DRH capability of 40 MW, determined by linear interpolation between L1 and L2.*
3. *The unit is operating at -26 MW, with a MEL of 50, MIL of –50, SEL of 10 and SIL of -10. The unit's footroom is 24 MW (determined relative to MIL in this case, as the unit is below SIL), so it has a DRH capability of 16 MW, determined by linear interpolation between L1 and L2.*
4. *The unit is operating at 70 MW, with a MEL of 100, MIL of -100, and a SEL and SIL of 0. The unit's footroom is 170 MW (determined relative to MIL in this case, as both SEL and SIL are zero), so it has a DRH capability of 80 MW, determined by linear interpolation from L1 and L2.*



Limit and Price Submission

Declaring Limits

A unit may declare limits, capping its participation in a given service (DRL, DRH, DML, DMH, DCL, DCH), at a half-hourly granularity. The declared limits act as a cap on the capability determined from the unit's capability data. In other words, the quantity of response that a unit can provide is the lower of the declared limit and the capability.

For example, a unit might make the following declaration:

HH starting	DRL MW	DRH MW	DML MW	DMH MW	DCL MW	DCH MW
14:00	25	10	25	10	0	0
14:30	25	10	25	10	0	0
15:00	20	15	20	15	0	0
15:30	0	30	0	30	0	30

For example, a unit has a DRH capability of 35 MW based on the capability calculation and has submitted a DRH limit of 20 MW. The unit has 20 MW participating in DRH.

Alternatively, a unit has a DRH capability of 35 MW based on the capability calculation and a DRH limit of 50 MW. The unit has 35 MW participating in DRH.

For each half-hour, units may revise their limits but must make a final declaration by a deadline to be determined, likely around 16.00 on the prior EFA day.

Alternatively, submissions and resubmissions could be allowed until gate closure. This is our preferred long-term direction but has a much larger cost and impact to deliver, so we aim to go live with day-ahead submissions and then enable in-day submissions in due course.

In the event that no limits are declared by this deadline in respect of a particular service and a particular half-hour, the unit is treated as having submitted a limit of zero for that half-hour, in effect not participating in the optional service for that half-hour.

Units could request to have "persistence defaulting" applied to their limits; in this case, the unit's limits from the prior half-hour would be continued into the next, and so forth.

Price Submission

Prices for provision of each of the response services may be submitted at a half-hourly granularity. The unit of the price is £/MW/h.

For each half-hour, units may revise their prices as often as they wish but must make a final price declaration by a deadline to be determined, likely around 16.00 on the prior EFA day.

Alternatively, submissions and resubmissions could be allowed until gate closure. This is our preferred long-term direction but has a much larger cost and impact to deliver, so we aim to go live with day-ahead submissions and then enable in-day submissions in due course.

Units could request to have "persistence defaulting" applied to their prices; in this case, the unit's prices from the prior half-hour would be continued into the next, and so forth.

State of Energy Management

Minimum State of Energy Requirement

As stated above, the limits as submitted by a unit at the relevant deadline are thereafter treated as a firm commitment. To that end, units are required to attain State of Energy levels adequate to deliver against that commitment.

This means that, for an Energy Limited asset:

- At the start of any given half-hour, the unit must meet a Minimum State of Energy Requirement.
- As a default, this is the State of Energy which would allow it to deliver frequency response at its declared limit for the maximum delivery duration (at time of writing: 15 minutes for DC, 30 minutes for DM, and 60 minutes for DR).
- If the unit has declared limits for multiple services, the Minimum State of Energy Requirement is the most onerous requirement for any single service, in each direction.
- If the unit has provided Dynamic Response as part of this optional service at any point since the most recent limit submission deadline, then the Minimum State of Energy Requirement is reduced by the maximum possible energy delivery as a result of that provision.
- Unlike the day-ahead service, there is no Energy Recovery requirement. The provider is expected to resubmit any limits past the submission deadline to reflect their expected state of energy following any instructions.

Interaction with day-ahead obligations

In the event that a unit is delivering against a response contract or contracts secured at day-ahead, its minimum state of energy requirement and energy recovery requirements are the aggregate of the two obligations.

Monitoring

All energy-limited assets offering the real-time service will provide a state of energy signal to NESO; for BM units, via the GC166 provisions now in development.

Availability

Provisions already exist for a unit to declare itself unavailable if, having been awarded a day-ahead Dx contract, it is unable to fulfil that contract for technical reasons. This availability signal will be re-used for instructible Dx: for example, if a unit declares itself unavailable for DCH provision, it will not be instructed until it is available again.

Instruction

NESO may send an instruction to a unit at any time, requesting that it start, or cease, provision of any of the response services for which it has availability. There are thus 12 possible instructions:

Start providing DRL	Start providing DML	Start providing DCL
Stop providing DRL	Stop providing DML	Stop providing DCL
Start providing DRH	Start providing DMH	Start providing DCH
Stop providing DRH	Stop providing DMH	Stop providing DCH

The carrier for these instructions is to be determined; it is likely to be EDL or some equivalently secure and resilient link.

Each instruction will include a delivery time: the time from which the unit must start, or stop (as the case may be) delivering the service in question. The delivery time will have a precision of 1 second and will always be at least 2 minutes after the instruction issue time.

We could allow units to submit a notice period, in seconds, to be no greater than 120 seconds – this would allow units able to start providing response at shorter notice periods to indicate that, and benefit from the added flexibility.

In many contexts, a precision of 1 minute is acceptable, as it can only create a delay of 59 seconds. In the case of real-time instruction of response, a 59-second delay can be material, hence the decision to apply a higher precision in this case.

We will ultimately implement the option to include a MW value. This is the desired quantity of response to be provided, although it is still capped by the unit's capability (in other words, on occasions where the instructed MW value exceeds the unit's capability, the unit should only provide the lowest of those values). The instructed MW value will never exceed the unit's declared limit.

If no MW value is included, the unit should simply provide the maximum amount of response (capability capped by declared limit) until a stop instruction is received.

A unit will have the option to declare itself an "all-or-nothing" unit, meaning that response instructions sent to that unit would never have a MW value.

Receipt of Instructions

Once the provider has received the instruction, an acceptance or rejection should be sent back to NESO as soon as practicable, and in any case within two minutes of the issue time, indicating whether the unit will follow the instruction.

While the unit is under instruction, it should continue to change its nominal operating level in line with its PN or baseline as previously submitted, or any BOA's received, and provide response relative to that level as it does so. Such changes in nominal operating level will usually change the quantity of response the unit is expected to provide from moment to moment.

Instructions may only be rejected on technical and safety grounds. In either case, the provider should immediately furnish NESO with an explanation for the rejection. Failure to do so, or provision of an explanation which does not adequately justify the rejection on technical and/or safety grounds may, at NESO's sole discretion, result in the unit being suspended both from the real-time and day-ahead Dynamic Response markets.

These provisions align as closely as possible with the existing provisions for Ancillary Service instructions as specified in section BC 2.8 of the Grid Code. Since the provider has the ability to declare themselves unavailable when unable to provide the service, we expect that rejected instructions would be very rare, but the possibility still exists that an instruction is issued between the discovery of an issue and the submission of an unavailable signal.

Instructions to Multiple Services

Once the ability to include a MW value in an instruction is implemented, NESO may send instructions splitting a unit's real-time capability in a particular direction between two different services. This will only be done when:

- The capability curve for each of the instructed services is identical.
- The unit is not an all-or-nothing unit.

The total instructed MW value between all such instructions will be less than or equal to the lowest declared limit across the instructed services.

In the event that the unit's ability to provide the services is restricted by its capability, the unit should reduce provision of each service proportionally.

Example: A unit has a capability of 50 MW for both DRL and DML, and has submitted a limit of 30 MW for DRL and 50 MW for DML. NESO can instruct the unit to provide 15 MW of DRL and 15 MW of DML. NESO cannot instruct the unit to provide 15 MW of DRL and 25 MW of DML, because the total instructed volume of 40 MW exceeds the unit's DRL limit of 30 MW.

Interactions with MFR/Mode B/Mode C

Some units will be capable of providing both the real-time Dx service and one of the existing real-time services (MFR, Mode B, Mode C). NESO's expectation is that the real-time Dx service will always be more economic than the existing services and will quickly replace them. However, there will several years during which some units are able to provide both sets of services.

NESO will not instruct any unit to provide Dx concurrently with any of these pre-existing services.

Stacking and Splitting: Concurrent Provision

Units providing Dynamic Response, Quick Reserve or Slow Reserve in line with a day-ahead contract may offer in-day Dynamic Response, but the limits submitted should be chosen so as to protect the unit's day-ahead obligations (both in terms of MW range and, where relevant, state of energy reserved for energy recovery).

This is Splitting: the unit may split its available flexibility between services but may not offer flexibility contracted at day-ahead into an optional in-day service.

Units providing Balancing Reserve in line with a day-ahead contract may offer in-day Dynamic Response irrespective of the Balancing Reserve obligation.

This is Co-Delivery: the unit may offer the same flexibility for Dynamic Response that has already been secured for Balancing Reserve.

Stacking and Splitting: Sequential Provision

Notwithstanding the previous section, the onus to preserve capability for future contractual obligations lies with the service provider. If provision of real-time Dx would put those future contractual obligations at risk, then the provider should not offer the real-time Dx, or should leave time to recover its capability prior to the start of the contracted period.

Protecting the capability to deliver a future contractual obligation **is not** grounds for rejecting an instruction. Once the deadline for limit/price submissions has passed, they are treated as a firm commitment.

Pricing

Payment

The payment for provision of the service will be made based on the timing of instructions and the unit's response capability (capped by declared limits) during those instructions. If the price or limits change (because the instruction spanned multiple half-hour periods) or the capability changes (due to the unit's operating level, or reference point, changing) then the payment will be calculated as the integral over time of (price*capped capability).

This is pay-as-bid pricing, and will be totally unlinked to the day-ahead prices. It is thus an exception to retained EU regulation 2019/943 and will require the submission of a cost-benefit analysis under the GB Pricing Proposal v1.1, which will be submitted once a formal consultation has been conducted.

With that said, the rationale for using pay-as-bid pricing in this instance is simple – the size and duration of the requirement for the service is not knowable at the time prices are submitted, and the choice of unit may be influenced by factors other than the service price, such as location or the need to use the unit for energy balancing.

Performance Monitoring

Performance monitoring errors, and hence performance k-factors, will be determined per settlement period in line with Schedule 3 of the Dx service terms. The performance bounds used for performance monitoring will determined based on the combined delivery of day-ahead contracted response and instructed response.

This persists the current idea that a unit's payments for a given settlement period are deducted based on the worst performance at any time during that settlement period. This means that, say, two instructions in the same settlement period may both have their payment deducted if either one is under-delivered against. This allows us to penalise under-delivery in proportion with the day-ahead service, making under-delivery against either day-ahead or in-day obligations equally undesirable.

Grace Period 1 will apply to monitoring of performance at the start and end of instructed delivery periods. The only exception to this is when the unit is switching from delivery of FFR or MFR to delivery of Dx response, or vice versa, in which case Grace Period 2 will apply instead.

Penalties

The penalties for non-delivery of the optional service, once instructed, will be determined in the same way as non-delivery penalties for the day-ahead service.

Response Energy

The management of response energy – both submission of ABSVD, and payments for response energy – will mirror the provisions of the existing Dx services (at time of writing, there is zero payment for response energy).

A review of response energy arrangements is expected in the near future, but we intend to keep response energy payments aligned between the day-ahead and optional routes to market in order to maintain market coherency.

Transparency

The following data items will be published, for each participating unit in each service, in order to maximise transparency in the real-time Dx market and thereby create as level as possible of a playing field.

- Capability curves. Published once pre-qualification is complete.
- Submitted participating MW limits. Published once the submission deadline is passed.
- Submitted instruction prices. Published once the submission deadline is passed.
- Issued instructions. Published at the end of the half-hour when the instruction was issued.
- Changes to the availability of individual units. Published once the availability change is received by NESO.

This doesn't include operational metering; mostly because of the sheer volume of data involved, and partly because data about individual providers' performance doesn't fall under the ambit of market transparency.

Glossary of Terms

Dynamic Containment (DC)	A frequency response service delivered between 49.5-50.5 Hz, with a 1-second delivery time. Split into high- and low-frequency services (DCH and DCL). Mostly delivered outside of the 49.8-50.2 Hz range to contain frequency following a large fault.
Dynamic Moderation (DM)	A frequency response service delivered between 49.8-50.2 Hz, with a 1-second delivery time. Split into high- and low-frequency services (DMH and DML). Mostly delivered in the final 0.05 Hz in each direction, to provide a buffer against rapidly emerging imbalance.
Dynamic Regulation (DR)	A frequency response service delivered between 49.8-50.2 Hz, with a 10-second delivery time. Split into high- and low-frequency services (DRH and DRL). Delivered linearly across the range, to mitigate slowly emerging imbalance.
Dynamic Response (Dx)	The collective name for DC, DM and DR. The three services share a large portion of their service terms and are designed to work in concert.
Frequency	The frequency of oscillation of alternating current in the GB power system. In the event of an imbalance between energy imports and exports from the power system, frequency will rise (when there are more imports) or fall (when there are more exports). Frequency is thus the first and most useful indicator of imbalance on the power system. For the GB power system, nominal frequency is 50Hz ±1%
Mandatory Frequency Response (MFR)	A frequency response service delivered between 49.5-50.5 Hz, with a 10-second delivery time. Delivered roughly linearly across the range. Provision of this service is mandatory for most BM participants.
Maximum Export Limit (MEL)	A time-varying parameter submitted by BM units to indicate their maximum achievable export level. See Grid Code BC1.A.1.3.1 In the case of NBM units, this would be assumed equal to the corresponding pre-qualification parameter.
Maximum Import Limit (MIL)	A time-varying parameter submitted by BM units to indicate their maximum achievable import level. See Grid Code BC1.A.1.3.2 In the case of NBM units, this would be assumed equal to the corresponding pre-qualification parameter.
Stable Export Limit (SEL)	A parameter submitted by BM units to indicate the minimum export level achievable in a stable manner. See Grid Code BC1.A.1.5
Stable Import Limit (SIL)	A parameter submitted by BM units to indicate the minimum import level achievable in a stable manner. See Grid Code BC1.A.1.5