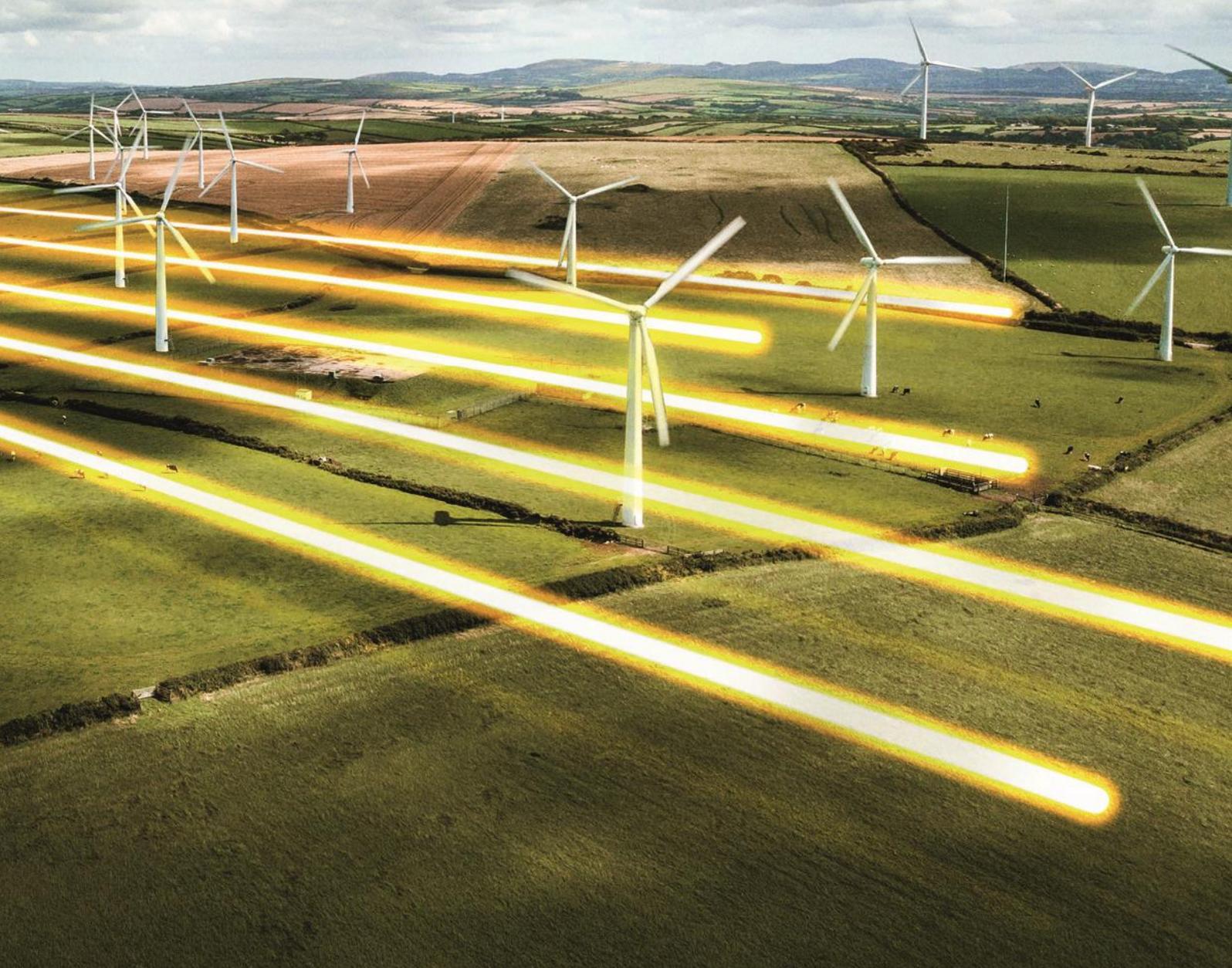


B6 Constraint Management Pathfinder 2024/25: Final Service Specification

Monday 08th August 2022



Contents

Disclaimer	3
1. Purpose	1
2. Introduction	1
3. Background.....	1
4. Service Outline	2
4.1 Technical Operation	2
4.2 Commercial Information.....	3
5. Tender Procedure.....	4
5.1 Tender Period.....	5
5.2 Tender Evaluation - Section Amended from EOI service specification.....	5
5.3 Further Information	6
6. Technical Specification and Evaluation.....	7
6.1 Availability	7
6.2 Instruction to Arm.....	7
6.3 Arming	8
6.4 Minimum Availability Duration – Section added after EOI service specification.....	8
6.5 Disarming.....	8
6.6 Tripping.....	9
6.7 Onshore Generation	9
6.8 Offshore Generation – Section Amended from EOI service specification	9
6.9 Distribution-Connected Generation.....	9
6.10 Service Stacking	10
6.11 Control and Indication Facilities.....	10
6.12 Units Connected to the Same Circuit Breaker – Section Amended from EOI service specification	10



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1. Purpose

The purpose of this Service Specification is to provide interested parties and prospective participants with the details of the B6 Constraint Management Pathfinder 2024/25 (hereafter referred to as “B6 CMP 2024/25”) service, including both the commercial aspects and technical requirements.

2. Introduction

National Grid Electricity System Operator (ESO) is seeking to reduce network congestion costs and create an electricity system that can operate carbon-free. To support this, the B6 CMP 2024/25 is seeking to connect Generators (which are already connected to or contracted to connect to the transmission network in Scotland before October 2024) to the Anglo-Scottish Commercial Intertrip Scheme (known as the “B6 CIS”). This scheme seeks to disconnect generating assets from the network within 150 milliseconds (ms) should a network fault occur. This will enable the ESO to operate the system at a higher capability, thus maximising the use of existing assets and reducing potential curtailment on renewable generation.

The ESO is requesting Generators in Scotland (north of the B6 boundary) to express an interest in the B6 CMP 2024/25. The information provided by the Generators at this stage shall be subject to technical assessments conducted by the ESO and the Scottish Transmission Owners (TOs) to understand if the Generators fulfil the technical requirements of the service. Further information on the technical assessments, as well as the commercial aspects of the B6 CMP 2024/25 process, can be found over the following pages.

Please note that the naming convention for the B6 CMP Framework Agreement and the B6 CMP Standard Contract Terms has changed to the B6 Constraint Management Intertrip Service (CMIS) Framework Agreement and the B6 CMIS Standard Contract Terms respectively. Please refer to the B6 CMP 2024/25 Consultation Feedback Summary for further information.

3. Background

In 2021 the ESO tendered for an intertrip service aimed at expanding the B6 CIS, thus opening the market to new entrants. The approach for the initial B6 CMP service (hereafter referred to as “B6 CMP 2023/24”) referenced an annual tender process, the first of which concluded in November 2021. Since then, the ESO has sought to develop its approach based on feedback received and lessons learnt. This Service Specification for the B6 CMP 2024/25 establishes the renewed service details for expected service delivery from October 2024 through to at least September 2025.

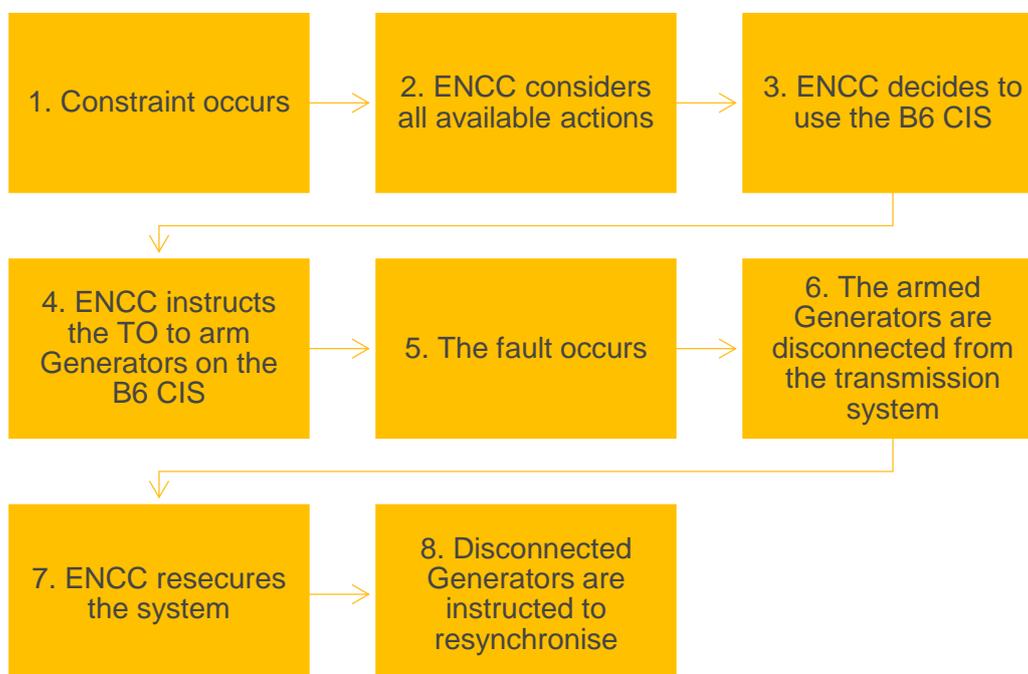
4. Service Outline

4.1 Technical Operation

The Electricity National Control Centre (ENCC) monitors network constraints and ensures that the electricity system is operated in a safe, secure, and economic manner in real time. When a constraint is active, i.e. the expected flow across the constraint circuits exceeds the transfer capability of the circuits, the ENCC curtails generation to reduce the expected flow by taking actions in the Balancing Mechanism (BM). The objective of the B6 CMP 2024/25 is to provide the ENCC with an additional tool to manage network constraints.

Under the B6 CMP 2024/25 service, once a constraint occurs the ENCC assesses the constraint and looks to arm the excess volume of generation that exceeds the transfer capability to be intertripped, provided that the armed volume does not exceed the largest permissible loss on the system. Once armed, the Generator is informed by the ESO that they are armed on the B6 CIS. If any of the faults selected to be monitored on the B6 CIS materialise, the B6 CIS shall trigger the opening of the required transmission circuit breaker(s), thus disconnecting the Generator from the transmission system in 150ms. Following the fault, the Generator shall be notified by the ENCC that they have been disconnected. The ENCC then resecures the system by investigating the cause of the intertrip event and taking action to recover the system. During this time, the Generator shall be instructed to remain desynchronised until further instruction from the ENCC. The Generator shall be deemed automatically disarmed following the fault, but upon resolving the network fault, the ENCC shall instruct the Generator to re-synchronise onto the transmission system and resume operation when it is safe to do so. The above process is summarised in **Figure 1** **Error! Reference source not found.**:

Figure 1: Technical Operation of the B6 CIS



4.2 Commercial Information

Generators can earn two forms of revenue under the B6 CMP 2024/25 service, as below:

1. Arming fee (£/MWh): this is the fee that the ESO pays when the Generator is armed until either the Generator has been notified that they have been disarmed or until a trip occurs on the circuits that the B6 CIS was monitoring and the Generator is tripped off as a result. This payment shall cover all settlement periods the Generator was armed for. The arming fee can be resubmitted monthly during the service delivery period, providing the price resubmitted is less than the price cap submitted during the tender process. The arming fee is paid on a £/MWh basis and Generators shall be paid based on the volume of energy exported for each settlement period while the asset is armed, using metering data provided by Elexon. This has changed from the B6 CMP 2023/24 tender process, where Generators were asked to provide a set arming fee per settlement period (£/settlement period) for each of their assets and has therefore removed the need to derate wind output by 65%.
2. Tripping fee (£/trip): this is the fee that the ESO shall pay, as a one-off cost per trip, should the network fault occur when the Generator is armed on the B6 CIS. This payment is intended to cover costs incurred by the Generator in being tripped off and cannot be resubmitted during the service term.

Please note that there is no availability fee for this service and the cost of providing an intertrip connection between the B6 CIS and the transmission circuit breaker to facilitate the connection is expected to be financed through regulatory funding (to be recovered by the relevant TO) rather than by the Generators themselves. For this reason, Generators should not factor in the costs of connecting from the transmission circuit breaker to the B6 CIS in their pricing submissions.

5. Tender Procedure

This section details the process that the ESO shall use to determine which Generators to connect to the B6 CIS for delivery in 2024/25. Below is the indicative timeline for the tender procedure for B6 CMP 2024/25:

Stage:	Indicative Start Date:	Indicative End Date:
Consultation on Draft Contract Terms and Service Specification	Mon 07/02/22	Fri 25/02/2022
Expression of Interest Period	Mon 28/02/2022	Fri 29/04/2022
TO Feasibility Studies	Mon 02/05/2022	Fri 10/06/2022
ESO Review of TO Feasibility Studies	Mon 13/06/2022	Fri 22/07/2022
Generators Notified of TO Feasibility Studies Outcome	Mon 25/07/2022	Friday 29/07/2022
Technically Feasible Generators Sign the B6 CMIS Framework Agreement	Mon 08/08/2022	Fri 02/09/2022
Tender Preparation by ESO	Mon 01/08/2022	Fri 05/08/2022
Tender Period (for Price Submissions)	Mon 08/08/2022	Fri 02/09/2022
Tender Evaluation by ESO	c. September 2022	
Generators Notified of Tender Outcome (for Price Submissions)	c. October 2022	

The tender procedure is as follows:

1. Generators expressed an interest in the B6 CMP 2024/25. - *Completed*
2. The ESO and the TOs conducted Feasibility Studies. These were to check whether the Generators met the technical requirements and were therefore able to be connected to the B6 CIS. - *Completed*
3. The ESO will sign all technically feasible Generators up to the B6 CMIS Framework Agreement and request an arming fee and a tripping fee from all technically feasible Generators.
4. The technically feasible Generators that have signed up to the B6 CMIS Framework Agreement and provided prices shall be assessed.
5. Tender outcomes will be communicated to participating Generators.

Based on learnings from the B6 CMP 2023/24 tender process, to enable efficient tender timelines following the EOI stage, the ESO shall grant 4-weeks for Generators to provide their fee submissions following the communication of the outcome of the Feasibility Study stage. Therefore, Generators are advised to begin discussing their commercial positions as early as possible to avoid any delays.

5.1 Tender Period

During the tender period stage of the process, the ESO shall sign all technically feasible Generators up to the B6 CMIS Framework Agreement, thereby binding the Generators to Section 3 (“CMIS Tenders”) of the B6 CMIS 2024/25 Standard Contract Terms for the duration of the B6 CMIS Framework Agreement. If a Generator is successful in the B6 CMP 2024/25 tender process, the Generator shall be bound by the entirety of the B6 CMIS 2024/25 Standard Contract Terms.

In parallel to ensuring Generators sign the B6 CMIS Framework Agreement, the ESO shall request an arming fee and a tripping fee from all technically feasible Generators. Further information on these fees can be found in section [4.2: Commercial Information](#).

Please note:

1. The arming fee provided by each Generator in this process shall act as their price cap, meaning it cannot be increased above the price cap during the service term, but can be decreased during the service term to encourage ongoing competition.
2. The tripping fee provided by each Generator in this process is fixed, meaning it cannot be changed at all during the service term.

Please refer to the B6 CMIS 2024/25 Standard Contract Terms for further information on the contractual requirements of the B6 CMP 2024/25 service. For successful Generators, the ESO reserves the right to request that contracts commence early (pre-October 2024) if the TOs deliver the required CIS connections for successful assets before October 2024, or late (post-October 2024) if the TOs are delayed in delivering the required connections for successful assets.

5.2 Tender Evaluation - Section Amended from EOI service specification

The technically feasible Generators who have signed up to the B6 CMIS Framework Agreement and provided prices shall be assessed. The assessment process is outlined below:

There are currently 36 channels available on the B6 CIS. This means that the number of generators that the ESO can contract with will be limited by the 36 channels, noting the provisions set forth later in this section regarding the ESO’s ability to change the number of channels available (e.g. due to extreme price disparities) and in section [6.11: Units Connected to the Same Circuit Breaker](#). The ESO shall determine the lowest cost Generators by normalising the tripping fee to a unit £/MWh rate and adding this to the arming fee to determine service cost using the following formula:

$$\text{service cost (£/MWh)} = \text{arming fee (£/MWh)} + \frac{\text{tripping fee (£/trip)}}{\text{TEC} \times 1500 \times 25}$$

The above is where:

- arming fee and tripping fee are values submitted in the commercial tender
- TEC = the Transmission Entry Capacity of the generating asset

- $\frac{1}{1500 \times 25}$ = the probability of a fault occurring within 3000¹ settlement periods or 1500-hours over 25-years²
- The ESO is expected to arm up to 800MW on an intertrip for the B6 boundary at any given time, so the base requirement to contract with has been set for the B6 2024/25 tender at 1.6GW. This is double the expected maximum volume that the ESO will arm at any given time to facilitate competition and provide contingency for the ESO in operational timescales. The ESO will ensure that the total capacity of the awarded Generators will meet the base requirement of 1.6GW on the B6 CIS. If the lowest cost combination of Generators within the limit of 36 channels are unable to meet the ESO's base requirement of 1.6GW, then the ESO shall reassess the combination of Generators to identify the lowest cost combination of Generators that at least meets the base requirement of the ESO. As long as the awarded parties meet the base requirement of 1.6GW, then the total number of awarded Generators will be decided at the ESO's discretion.

5.3 Further Information

The ESO, at its sole discretion, can change the details of section 5: Tender Procedure at any stage of the B6 CMP 2024/25 process up to contract award. This includes, but is not limited to, changing the base requirement of 1.6GW and/or the number of Generators able to connect to the B6 CIS. For example, if the ESO identifies extreme price disparities between the Generators, then at the ESO's sole discretion it can choose to reduce the number of Generators able to connect to the B6 CIS, which is currently set at 36.

The ESO, at its sole discretion, reserves the right to request the resubmission of prices prior to contract award from any or all Generators involved in the B6 CMP 2024/25 tender process.

In future years, the ESO may undertake further EOIs to allow more technically feasible Generators to sign up to the B6 CMIS Framework Agreement and thereafter participate in the subsequent tender process. In this instance, Generators that were previously signed up to the B6 CMIS Framework Agreement are not required to submit as part of the EOI process but shall still be assessed by the TOs to ensure the ESO's technical requirements are fulfilled. Where an existing Generator continues to meet the ESO's technical requirements of the B6 CMP service, then the Generator shall not be required to re-sign the B6 CMIS Framework Agreement and can participate in the subsequent tender process. However, if an existing Generator fails to meet the ESO's technical requirements of the B6 CMP service, then the Generator shall not be able to participate in the subsequent tender process, though the B6 CMIS Framework Agreement would remain in place. Before future EOIs and tender processes are carried out, the ESO shall detail and/or reconfirm the technical and commercial parameters of the B6 CMP service. Please note that technical assessments are expected to be undertaken annually between the ESO and the TOs moving forward, even if existing contracts are extended, to ensure that assets can continue to deliver the contracted service.

¹ The ESO assumes the B6 CIS will be armed between 1500-hours (3000 settlement periods) and 3000-hours (6000 settlement periods) per annum. To calculate the highest potential service cost, specifically for assessment purposes, the ESO will assume this service is used for 1500-hours per annum.

² This is an estimate based on the proportion of exposed conductor across B6 CMP monitored circuits and the total amount of exposed conductor on the GB transmission system, while considering the frequency of the type of faults to be monitored by the B6 CIS.

6. Technical Specification and Evaluation

The ESO must operate the system to the requirements set out in the Security and Quality of Supply Standards (SQSS). In planning the network in operational timescales, the ENCC operates the system to a secure power transfer limit considering various network faults. If the transfer exceeds this limit, the ENCC must reduce the power flow pre-empting the worst network fault, however unlikely to occur on the system. The B6 CMP 2024/25 is looking to use a CIS which will send a signal to a TO circuit breaker on the system and quickly disconnect the Generator only at the time of the fault. This means the ENCC are able to allow more generation to flow through the circuits pre-fault, hence reducing curtailment and potentially reducing network congestion costs for this region significantly. This section outlines the technical requirements and assessment process to evaluate eligibility of interested Generators.

6.1 Availability

1. The Generator will be deemed available to be armed whenever it is exporting active power onto the transmission system.
2. Generators are expected to exercise good industry practice in maintaining their assets, such that when there is a fault on the system, the asset can deal with the impact of being tripped by the B6 CIS.
3. The Generator must declare to the ESO its unavailability for the B6 CIS in the following circumstances:
 - a. If it is disconnected or desynchronised for whatever reason, or;
 - b. If it is facing technical issues, rendering it unable to provide the service, or;
 - c. For the periods that it is contracted to provide a Response or Reserve service.

6.2 Instruction to Arm

1. The form of the “arming instruction” and “disarming instruction” will be determined at the point of contract signature in relation to whether the party would like the instruction to be provided in the form of an email and/or a fax. In future, the ESO is looking to design a system where the arming status of an asset can be viewed in real time.
2. The Generator can be armed at any time during the service term by the ESO issuing an “arming instruction” to the TO. During this time, the TOs, Offshore Transmission Owner (OFTO) (if needed) and the Generator shall be notified of this instruction.
3. The notification of an “arming instruction” is to be confirmed as soon as reasonably practicable by the ESO. This shall include the date, time and the specific Generator that is armed to provide this service.
4. The ESO would only arm the generation volume up to the largest infeed loss that can be securely tripped off the system without leading to instability or large disturbances on the network, i.e. tripping of embedded generation by Loss of Main protection. The ESO shall ensure there is sufficient Reserve and Response in real time for the intertrip actions taken on the system.

6.3 Arming

1. The TO and the Generator must comply with the arming of the B6 CIS in accordance with an “arming instruction”.
2. The Generator acknowledges that the arming of the B6 CIS can be at any point when exporting active power to the transmission network.
3. The arming period shall be from the point that the ESO issues the arming instruction to the TO.

6.4 Minimum Availability Duration – Section added after EOI service specification

1. Constraint duration – analysis:
 - a) The ESO has analysed the last 2 years of constraint duration data and concluded that a provider needs to have the capability to be armed for at least 8 hours as a minimum. It is required that the Generator will be producing active power over 0MW during the entire arming period, Generators will be disarmed if they are generating at 0MW or below.
 - b) Please note, 8 hours is the minimum duration that a constraint is predicted to be active for, it can be longer³. Generators may be armed for the full duration of the constraint.
2. ENCC – real time constraint management:
 - a) It can be uncertain when a constraint will be active because of variable weather conditions. The ESO’s analysis has demonstrated that the B6 constraint is most often active when the wind level is high.
 - b) The ENCC utilises the Generator submitted generation profiles (Balancing Mechanism Physical Notifications) to decide which Generators to arm. The ENCC will arm parties that are expecting to generate for the duration of the constraint.
3. All parties must be capable of continually generating for a minimum of 8-hours:
 - a) Parties will need to confirm that their assets can be armed, without prior notice from the ENCC, and will be able to continually generate for a minimum of 8 hours when armed. Parties will need to explain as part of the tender submission how they will achieve this requirement. The ESO will not require Generators to prove this in real time when the service is active.

6.5 Disarming

1. The ESO will instruct the relevant TO to disarm the intertrip and notify the Generators involved.
2. The B6 CIS is also deemed disarmed when either the contracted Generator is desynchronised for any reason or has been tripped by the B6 CIS within 150ms of the fault.
3. The disarming will be effective from the point when the Generator was either tripped or has been required to be disarmed by the ESO.

³ In April and May 2022, for example, the average arming duration was 28 hours.

6.6 Tripping

1. Once the signal from the B6 CIS has been received, the Generator must be disconnected or desynchronised within 150ms from fault inception to circuit breaker open. The active power output from the generating asset should be 0MW following the event.
2. The Generator must remain disconnected until notified by the ENCC that they can be re-connected and synchronise safely.
3. There is no maximum limit to the number of trip events per annum. However, the likelihood of the intertrip being tripped is statistically low, with a probability of a trip estimated to be once in every 25-years (hence the division of the submitted tripping fee by 25, in section [5.4: Tender Evaluation](#)).
4. The Generator shall be aware of the impact and costs of a trip on their asset's health and undertake maintenance work (if needed) to ensure the asset is able to continue delivering the service throughout the contract period.
5. Full system redundancy must be guaranteed by dual communication routes, connections to intertrip initiations, and connections to the circuit breaker. The level of redundancy within the intertrip system shall be such that the initiation of a commercial intertrip is assured in the event of the loss of a single component, e.g. telecommunication route, and circuit breaker tripping coil.

6.7 Onshore Generation

- For an onshore Generator, the preferred approach is to trip a transmission circuit breaker, which can provide the required tripping speed (i.e. 150ms from fault occurrence) and dual redundancy.

6.8 Offshore Generation – Section Amended from EOI service specification

1. The analysis from the Feasibility studies has demonstrated that tripping the Generator circuit breaker at the Offshore Grid Entry Point would be significantly slower than 150ms and therefore the onshore TO circuit breaker at the Transmission Interface Point (TIP) will be used for the B6 CMP.
2. The ESO shall coordinate with the relevant TO, Generator and OFTO to determine if the asset can be connected to the B6 CIS by October 2024 and if so, agree the most appropriate way of connecting the asset to the B6 CIS. If an agreement cannot be reached between all of the parties involved by the time the tender has closed, the Generator shall be removed from the B6 CMP 2024/25 tender process.
3. The ESO is currently establishing a position on offshore assets that have no OFTO appointed, alongside Ofgem and the bidding assets. Further information will be provided once a position has been agreed between the ESO and Ofgem. If an agreement cannot be reached by the time the tender has closed, the Generator shall be removed from the B6 CMP 2024/25 tender process.

6.9 Distribution-Connected Generation

- If the Generator is connected to the distribution network, they were excluded from the B6 CMP 2024/25. This was due to the low likelihood of distribution connections meeting the double redundancy and 150ms tripping time.

6.10 Service Stacking

1. The B6 CMP service is classed as a Relevant Balancing Service and can be contracted for alongside a Capacity Market contract.
2. The B6 CMP service can be stacked alongside a Response or Reserve service, such as Dynamic Containment, Short-Term Operating Reserve etc., in that an asset can be contracted for these as well as B6 CMP 2024/25 but the Generator must declare itself unavailable for B6 CMP 2024/25 if contracted for a Response and Reserve service.
3. For any other current/future services, these may be stacked and able to be delivered alongside the B6 CMP 2024/25 service subject to written agreement with the ESO.
4. The ESO is unable to permit service stacking alongside Stability Pathfinder contracts, because the operational impacts of using the services simultaneously in real-time need to be accurately assessed to understand associated risks and countermeasures, which is not something the standard operational processes can currently accommodate. Please note that this position is being reviewed, with a view to potentially permit stacking with other Pathfinder services in future B6 CMP tenders.

6.11 Control and Indication Facilities

- The Generator shall:
 1. Ensure correct metering at the grid supply point.
 2. Ensure that the asset is available to be armed.
- The TO shall:
 1. Ensure that all assets that form part of the B6 CIS are maintained and in good order and all intertrip communication signals are intact and working.
 2. Prove that the remote circuit breaker to disconnect the provider will operate within 150ms from fault occurrence time.
 3. Acknowledge receipt of the instruction and carry out the instruction to arm and disarm the Generator.

6.12 Units Connected to the Same Circuit Breaker – Section Amended from EOI service specification

- As the B6 CIS is connected to onshore transmission circuit breakers, it is possible that multiple assets could be connected behind a single circuit breaker. If there is more than one asset connected behind the same transmission circuit breaker, then:
 1. If all relevant Generators submitted an EOI and the assets are technically feasible, then all shall be informed of dependencies to ensure any arrangements can be put into place between the dependent Generators. The prices requested by the ESO can either be submitted separately or jointly by the Generators, but irrespective shall be assessed as a single asset in the subsequent commercial assessment process (refer to section [5.2: Tender Evaluation](#)). The process of jointly submitting prices (if used by the Generators) must be decided and managed between the Generators in question, as the ESO shall not be involved in any discussions between the Generators. Please note, the dependent

Generators shall be treated separately from a contractual and settlements perspective but treated as a single asset by the ESO in operational timescales:

2. If only one of or some of the assets (i.e. not all assets) connected to or contracted to connect to the relevant circuit breaker submit an EOI and pass the Feasibility Study, in the first instance the non-participant party/ies will be contacted and invited to tender. Otherwise, the Generator or Generators in question will be informed of the situation and removed from the tender process to avoid the risk of tripping off assets not participating in the B6 CMP 2024/25.
3. If a new party connects behind the circuit breaker during the contract period that has not been a participant in the B6 CMP 2024/25 tender, they will be invited to join for the remainder of the contracting period provided that the total volume behind the circuit breaker does not exceed the largest permissible loss on the system.
 - a. The new party will be required to sign the same Terms and Conditions and bid the same or lower commercial prices than the original contracted party.
 - b. Adding the new party will not reduce the available channels because the new party will share the same intertrip channel as the original generator. However, it would increase the available MW that would be armed on that intertrip channel and therefore may impact the order in which the control room arm parties.
 - c. If the new party declines to join or rejects the requirements in 6.12.3a, or the existing party disagrees with another party connecting behind the circuit breaker, then the ESO reserves the right to remove the original party from the service to avoid tripping a non-contracted party.
4. If a generator has declared itself as 'unavailable' for the CMP, then any other generators behind the same circuit breaker will also be considered 'unavailable' to be armed.