Public

Guidance on Material Technology Changes

NESO Guidance on treatment of technology change Gated Modification Applications

NESO
National Energy System Operator

Public

Contents

1 Purpose of this Guidance

The purpose of this guidance is to outline how NESO will process Gated Modification Applications which relate to technology changes. In line with the Gated Modification Guidance[1], a technology change request for a project holding a Gate 1 agreement with Reservation or a Gate 2 agreement, is generally a Modification which will require a Gated Modification Application and can only be submitted in a Gated Application Window. This guidance document should be read in conjunction with NESO's Gated Modification Guidance, which sets out the rationale and classification of various Modifications as being Gated or non-Gated.

For clarity, and in line with the Gated Modification Guidance, a Gated Modification Application is generally required for any change or addition in technology regardless of whether it is 'front of meter' or 'behind the meter' of the connection site, and regardless of whether the technology change itself is deemed 'material'[2] or 'non-material'. As set out in this guidance, Users should note that a technology change may lead to changes in relative queue position(s) and / or contracted connection date(s) depending on the outcome of network studies during the Gated Modification process.

Please note that this guidance applies only to the reformed connections process introduced under Code Modification Proposal 434 (CMP434[3]) and so is relevant only once a Gate 1 or Gate 2 connection agreement is in place; it does not apply to the Gate 2 to Whole Queue process under CMP435[4] as Modifications (including technology changes / additions, with the exception of technology reductions / removals) are not permissible in the Gate 2 to Whole Queue process.

[1] NESO's Gated Modification Guidance provides further rationale for which Modifications are classed as Gated, and can be found here: https://www.neso.energy/document/360456/download

[2] In the context of this Guidance, 'material' has the meaning intended in CNDM, i.e. that a change could result in a loss or change of queue position.

[3] Code Modification Proposal 434 (CMP434): https://www.neso.energy/industry-information/codes/cusc/modifications/cmp434-implementing-connections-reform

[4] Code Modification Proposal 435 (CMP435): https://www.neso.energy/industry-information/codes/cusc/modifications/cmp435-application-gate-2-criteria-existing-contracted-background

2 Background

Users who hold a Gate 1 or Gate 2 connection agreement with NESO may seek to optimise their project design to maximise the use of that connection agreement. For example, a User may seek to add in a Battery Energy Storage System (BESS) to their onshore wind farm or solar plant in order to operate for longer periods at maximum capacity, and at times that the User would not previously have been able to generate. For Users holding a Gate 1 agreement with Reservation, or a Gate 2 agreement, the addition to and / or change in the technology of the project as envisaged in the connection agreement is to be treated as a Gated Modification. The User must submit a Gated Modification Application to inform NESO of this change. In such scenarios, it is important for the User to understand the impact of the technology change on its existing connection agreement.

3 Scope

This Guidance describes the process by which NESO will manage Gated Modification Application requests for technology changes made by the following groups of Users holding a Gate 1 agreement with Reservation, or a Gate 2 agreement:

- Directly Connected Generation (e.g. directly connected solar PV or BESS sites)
- Directly Connected (i.e. Non-Embedded) Demand (e.g. directly connected data centres or industrial sites)
- Interconnectors and Offshore Hybrid Assets and Non-GB Projects (connecting into GB)
- Relevant Embedded Small or Medium Power Stations (via the DNO or transmission connected iDNO)
- Embedded Small, Medium, or Large Power Stations (e.g. embedded generators holding a BEGA or BELLA)

When this Guidance refers to a 'technology change', this term is intended to include:

- A full change from one technology type / mix to one or more others, including changes 'behind the meter',
- A partial change from one technology type / mix to one or more others, including changes 'behind the meter', and

The scope of the term 'technology' within this Guidance includes:

- generation technologies (such as natural gas or solar or onshore wind)

- storage technologies (such as BESS or compressed air storage), and
- demand technologies (such as data centres or industrial facilities or carbon capture plants).

This Guidance is relevant to technology change requests for both:

- contracted sites, which are yet to be energised, and
- connected / energised sites looking to redevelop their existing site ('replanting').

Where a User submits a non-Gated Modification Application with a change that is later deemed to constitute a Gated Modification Application (such as a change to power electronics equipment, or turbine type which may impact the system / other Users), the application will be rejected and the User will need to re-submit it at the next relevant Gated Application Window.

In cases where a Gated Modification Application for a technology change results in a site with a changed category of connection and / or use[5], please note that the Modification Offer will reflect the obligations relevant to the changed category of connection which the User must comply with. This may include different contractual arrangements (such as charging arrangements, ownership boundaries and technical requirements) relevant to the changed category of connection.

The queue position(s) and connection date(s) in the Modification Offer will then be determined in accordance with the process described in this Guidance.

There may be cases in which a User needs to implement a technology change in order to comply with updated standards and regulations (for example, if there was a change in Grid Code requirements around grid-forming inverters). As such a change may not be User-led, NESO would take such circumstances into consideration when assessing whether the technology change would impact the connection date of the User.

4 Guiding Principle

NESO and the Transmission Owners (TOs) are required, as part of licence obligations, to operate the National Electricity Transmission System (NETS) in accordance with the Security and Quality of Supply Standard (SQSS). NESO and TOs also have a statutory duty to develop and maintain the NETS in an efficient, coordinated, and economic manner.

[5] The different categories of connection and / or use are defined in CUSC Section 1.2.

As the planning and development of the transmission network conducted by NESO and the TOs is a function of the connected and contracted position of projects in the connections queue, technology changes to contracted projects could likely impact the technical assumptions that have been used to develop and maintain the NETS, and thus can only be progressed through a Gated Modification Application. Such technology changes could impact the works required on the transmission system against the standards and requirements for safe, economic and efficient operation of the NETS, or they may also lead to impacts on the projects of other Users. For instance, changes to a project's technology could mean that existing transmission reinforcements identified may no longer be sufficient to comply with the SQSS and would require additional reinforcement works to accommodate the change. Given this, the impact of technology changes can be 'material' and can only be progressed through a Gated Modification Application.

Such changes to technical transmission design solutions could have significant implications for planning, procurement, cost-effectiveness and deliverability of required schemes, and thus need to be considered when assigning the appropriate queue order for the technology change request. Box 1 below provides examples and the rationale for treating technology changes with a later queue position in certain cases.

Why might a technology change impact queue position treatment?

Assume Project A is a thermal plant that already holds a Gate 2 contract to connect in a particular area, and Project B applies for a new Gate 2 contract to connect a wind farm in that same area. Project B holds a later relative queue position than Project A based on queue ordering process in the Connections Design Network Methodology (CNDM)[6].

In this case, the background assumptions against which Project B's connection was studied does not assume significant dispatch of Project A as there was little likelihood that both sites would export simultaneously. These background assumptions in network studies could lead to no works being required for Project B, and Project B being able to connect in 5 years upon completion of other Enabling Works.

If, in this case, Project A then requested to change their technology type from a thermal plant to a wind farm within its existing Transmission Entry Capacity (TEC), the transmission connection

[6] Connections Network Design Methodology (Apr 2025) can be found here: https://www.neso.energy/document/359781/download

design in terms of connection assets[7] and / or connection site works (e.g. substation bay(s), site transformers and / or switchgear utilised for their individual connection) may still be feasible. No changes to such connection assets / works may be required as they have been designed to accommodate the project's original TEC, which is unchanged.

However, the technology change may mean it is now more likely that both Project A and Project B would export power at the same times. If Project B was studied against the new / updated assumptions inclusive of Project A's technology change, the technology change may trigger additional reinforcement works that could take, for instance, several years to complete to ensure compliant connections (as defined in SQSS) for both projects. For instance, there might be more extensive, or different, reinforcement works *beyond* the connection site required to accommodate Project A (which has changed its technology and therefore likely operational behaviour) and Project B. As this change isn't driven by Project B, it's not appropriate that the impact of these resulting additional reinforcement works should fall into Project B's Gate 2 agreement.

The alternative, and the approach we will take, will be to treat Project A as having a later queue position due to its technology change – this means treating Project A with a queue position within the later Gate 2 batch in which the change was requested. In this case, as Project A is requesting a technology change across its entire site, the entire site would be subject to a later connection date to maintain a compliant system by ensuring relevant reinforcement works were completed, and to avoid impacts to other Projects.

As an additional example, if Project B was instead an energy storage site contracted with an earlier non-firm connection date (e.g. under NESO's Accelerated Storage initiative), the impact of Project A's technology change above could lead to additional time periods when Project B's export was likely to be curtailed. If that was the case, the background assumptions used to identify the level of restrictions for Project B and which Project B accepted ahead of its firm connection (e.g. the curtailment analysis undertaken by Project B) could now significantly change due to Project A's technology change.

As such, the approach we will take as example above will be to treat Project A's technology change as having a later queue position to avoid adverse impacts to others in the queue.

Box 1: Examples of technology change requests in which a customer may need to be treated with a later queue position to avoid impacts to the network / other Users

It is important to note that the key concern with technology changes (where remaining within existing contracted capacities) is not necessarily the impact on the design solution

[7] As per CUSC, connection assets are defined as those assets solely required to connect an individual User to the National Electricity Transmission System, which are not and would not normally be used by any other connected party (i.e. "single user assets").

for the customer's connection assets, i.e. 'local' and / or connection site works, such as substation bay(s), site transformers and / or switchgear, which are typically designed to accommodate a project's requested capacity regardless of technology type. Rather, the issue is the potential for technology changes to impact the background technical assumptions utilised by NESO / TOs for other customers' connection designs, and / or the transmission reinforcement works that have been identified deeper in the system to support these connections. These technical assumptions are sensitive to technology types as NESO and the TOs consider the probabilistic operational behaviour of projects to facilitate economic and efficient network build. As such, technology changes can often have a significant impact on network planning / transmission build requirements and where this is the case should have a later queue position applied to account for the impact of these changes on transmission network planning requirements.

In the context of this guidance, a 'later queue position' has the same meaning as that in the Connections Network Design Methodology (CNDM) i.e. a project / element of a project with a later queue position would have lower relative priority compared to a project with an earlier queue position, and therefore may require additional reinforcement works to be completed ahead of its connection to/use of the NETS. A project / element of a project may also hold a later relative queue position as a result of a technology change but trigger a different set of reinforcement works to support its changed connection. This will, in most cases but not always, and depending on the changed set of triggered reinforcement works, result in a later connection date.

4.1 Parameters to Identify Material Technology Changes

If a Gated Modification Application for a technology change meets any of the parameters below, it would be considered a 'material' technology change and the changed project or the changed / additional element of the project would be subject to the Gated Design Process and assigned a later queue position within the new batch (i.e. in which the Gated Modification Application was submitted) to ensure that necessary works and assumptions are implemented and studied appropriately ahead of its connection:

- The technology change substantially[8] changes the **thermal (MW) profile** (import and export) of the project in background modelling assumptions, which include

[8] Substantiality is to be determined on a case-by-case basis by NESO, but is intended to allow for random or very minor variations.

current Construction Planning Assumptions[9] (CPAs) or other technical assumptions relevant to the application, or

- The technology change increases the **fault level contribution** of the project, or
- The technology change increases **safety or constraint risks** to any known substantial degree, or
- The technology change substantially impacts the **procurement, work schedules, and / or system access planning** of the Transmission Owner (TO) where known at the time of the Gated Modification Application submission, which may otherwise lead to the change being unfeasible or subject to delays or additional costs.

Please note that NESO and the TO(s) may also consider other adverse impacts on the system or other Users that could arise from the technology change, beyond the parameters mentioned above. These impacts (such as a known substantial risk to power quality issues) may be specific to a User's design change and would thus be considered on a case-by-case basis informed by engineering judgment.

In most cases, we expect that a technology change is likely to trigger at least one of the above parameters such that it would not be able to retain its queue position for the changed project, or the changed / additional element of the project. For instance, a full change in technology from BESS to a data centre (even if remaining within the original contracted import capacity) will be treated with a later queue position. This is because the connection designs and reinforcement requirements identified for other customers would have considered the BESS site with cyclic or intermittent import behaviour (and / or typically not importing at times of high constraints) within the contracted background – however, the technology change to a data centre would mean the demand is now importing at full or baseload capacity across more time periods. This is a material

[9] Construction Planning Assumptions (CPAs) refer to the set of background modelling assumptions based on economic dispatch models, which NESO shares with the TOs for network study purposes (i.e. background assumptions on the contracted background in order to study a new connection). CPAs contain a view of the conditions on the NETS which ought reasonably be expected to arise in the course of a year of operation, against which the applying user should be studied. In some cases and depending on the type / scale of a technology change, the impact of the change on CPAs would be obvious without the need to re-run CPAs. In other cases, NESO may need to re-run a recent CPA or it may produce two sets of CPAs to compare the impact of the change. The modelling methodology used to create CPAs may change over time to reflect changes in network and technology landscapes.

change that would need to be accounted for in background assumptions, and should be treated with a later queue position to avoid impacts to economic and efficient network planning.

In cases where a technology change does not trigger any of the above parameters, it would be able to retain its current contracted queue position for the changed project following its Gated Modification Application for the technology change (i.e. the technology change would be considered not 'material').

5 Process Guidance

Users should always seek to engage their NESO Connections Contract Manager (CCM) as early as possible if considering a technology change request, so that potential implications of the change can be discussed or raised prior to any submission. If you are submitting a Gated Modification Application relating to a technology change, please indicate this technology change request clearly within your Gated Modification Application submission.

NESO will apply the principles described in Section 4 to consider whether the technology change would be deemed 'material' and thereby treated with a later relative queue position(s) – this consideration may also require input from TO(s). NESO will use reasonable endeavours to inform the User, either before commencement of the Gated Design Process or as soon as possible, on whether the technology change requested in the Gated Modification Application is likely to be deemed 'material' and thereby treated with a later relative queue position(s).

For the avoidance of doubt, should a User choose to withdraw its Gated Modification Application or choose not to accept / sign the Modification Offer, the existing position in the agreements will still remain .

6 Technology Change Requests at Gate 1 and Gate 2

This section describes how Gated Modification Applications for technology changes are managed for Gate 1 and Gate 2 projects .

6.1 Contracted projects holding a Gate 2 agreement requesting a technology change

For projects holding a Gate 2 Agreement, any subsequent request for a technology change will require a Gated Modification Application.

Once a Gated Modification Application has been submitted, the Gate 2 Criteria Methodology[10] will first be applied to determine if the project as changed will continue to meet the Gate 2 Criteria. This includes verifying whether the changed project continues to meet land or planning requirements (including ongoing compliance requirements), and strategic alignment criteria as set out in the Gate 2 Criteria Methodology.

NESO and the TO(s) will then consider, as per the principles stated in Section 4, whether the technology change is considered 'material' and would therefore impact the project's queue position treatment and connection date(s).

The following sections set out different possible outcomes depending on whether the changed project continues to meet the Gate 2 requirements.

6.1.1 Changed project continues to meet Gate 2 criteria

Figure 1 summarises the example scenarios for a project holding a Gate 2 agreement and submitting a Gated Modification Application for a technology change / addition, where the changed project is able to progress to Gate 2. Further details on queue formation in the Gated Design Process can be found in the CNDM Section 7.

[10] Gate 2 Criteria Methodology (Apr 2025) can be found here: neso.energy/document/359776/download

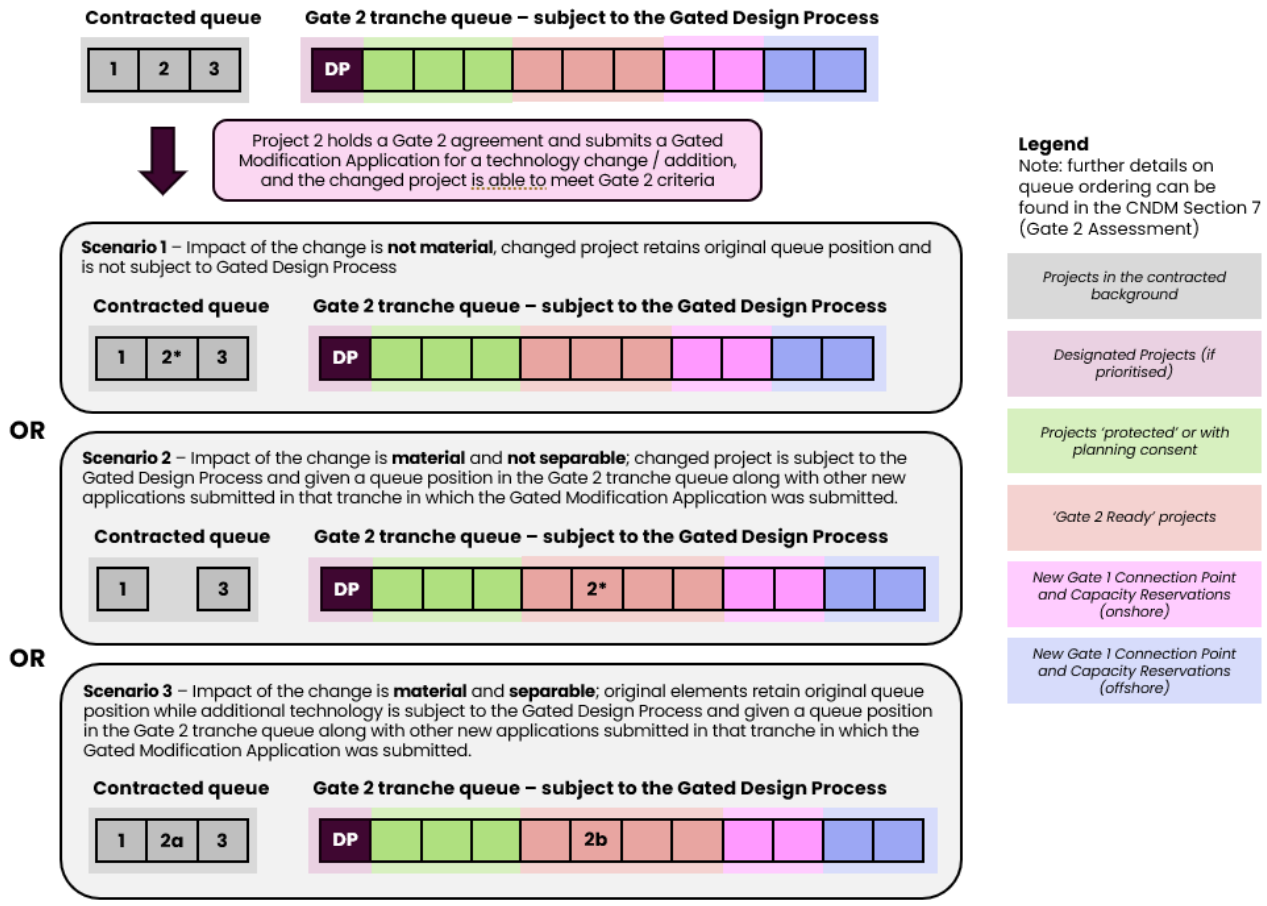

Figure 1: Example scenarios for a project holding a Gate 2 agreement submitting a Gated Modification Application for a technology change / addition

If it is determined that the change is not 'material', the changed project will retain its existing connection date stated in its Gate 2 connection agreement, and will not be subject to studies in the Gated Design Process. This results in Scenario 1 as per Figure 1 above.

If it is instead determined that the change is 'material', the changed project would need to be restudied as part of the Gated Design Process. If the User requested a full change in technology for the site, or if the impact of the technology change is not separable from that of the original project, the entire changed project will be subject to the Gated Design Process to receive a Modification Offer reflecting its later relative queue position. This results in Scenario 2 as per Figure 1 above. As per the CNDM, the relative queue order of the changed project will be determined by the date at which the changed project met Gate 2 readiness criteria.

If it is determined that the change is 'material' and the impact of the technology change can be separated from that of the original project, then only the changed element of the project will be subject to the restudy process and the existing project will retain its contracted connection date. This results in Scenario 3 as per Figure 1 above.

For example, an onshore wind farm holding a Gate 2 agreement may request to add a solar PV farm which meets Gate 2 criteria. If this technology addition is found to be 'material', it may be possible for the wind farm component of the connection to retain its existing connection date, with the newly requested solar PV component restudied as part of the Gated Design Process (in which the Gated Modification Application was submitted). As per the CNDM, the relative queue order of the changed element will be determined by the date at which the changed element met Gate 2 readiness criteria. This would likely result in the Gate 2 agreement for the overall project having staged connection dates.

The Gated Design Process as described in the CNDM will then be followed to determine the respective connection date(s) for the changed project.

6.1.2 Changed project is unable to progress to Gate 2

If a project currently holds a Gate 2 agreement, and requests a technology change that does not meet the Gate 2 Criteria at the time of the Gated Modification Application submission, the changed project (or changed element of the project) would not receive a Gate 2 offer to modify the Gate 2 agreement.

For example, an onshore wind farm holding a Gate 2 agreement may request to add a BESS facility. If the BESS facility does not meet Gate 2 criteria, the BESS facility would not receive a Gate 2 offer to be included in the Gate 2 agreement and only the onshore wind element will continue to hold its Gate 2 agreement.

6.2 Replanting of connected projects

The above principles and process in Section 6.1 also applies to all connected / operational directly connected transmission projects or embedded Large power stations holding a BEGA / BELLA that are replanting (i.e. replacing an existing operational site) with a different technology.

NESO and the ENA are developing a Capacity Reallocation Policy[11] for connected / operational Relevant Embedded Power Station(s) (REPS) that are replanting in areas where Appendix G applies. For such REPS that have already been assessed via established processes and listed on an existing Appendix G, if the technology change for replanting is allowable following the rules prescribed in the Capacity Reallocation Policy's replanting guidance (and subject to NESO and TO approval), the DNO or transmission connected iDNO would be allowed to utilise previously terminated capacity for the replanted project while retaining the project's queue position. Such a technology change would be considered not 'material' for the connected REPS. The relevant DNO or transmission connected iDNO would need to submit the exchange and updates for approval via an Appendix G update in accordance with the Capacity Reallocation Policy. The Appendix G update would be a non-Gated process and can be submitted anytime outside of the Gated Application Windows.

For REPS replanting in areas where Appendix G applies but where a technology change for replanting is not allowable following the rules prescribed in the Capacity Reallocation Policy's replanting guidance, the DNO or transmission connected iDNO will need to submit a Gated Modification Application to NESO reflecting the technology change as part of replanting. The REPS' technology change will then be assessed with consideration to the Capacity Reallocation Policy's replanting guidance.

For REPS replanting in areas where Appendix G does not currently apply, the DNO or transmission connected iDNO will similarly need to submit a Gated Modification Application to NESO reflecting the technology change as part of replanting. The REPS' technology change will then be assessed in accordance with the process described in this Material Technology Change Guidance.

6.3 Contracted projects holding a Gate 1 agreement requesting a technology change

As per the Gated Modification Guidance, technology change requests from projects holding a Gate 1 agreement with Reservation are deemed to constitute a Gated Modification, and can only be submitted at relevant Gated Application Windows.

Technology change requests from projects holding a Gate 1 agreement without Reservation are non-Gated Modifications and can be made at any time.

[11] The Capacity Reallocation Policy for replanting is currently being developed / revised by ENA to support connections reform; the current policy can be found here. We will provide an updated link to the Capacity Reallocation Policy for replanting as soon as it has been finalised and published.

6.3.1 Projects holding a Gate 1 agreement with Reservation

As per the CNDM, some projects may hold a Gate 1 agreement with Reservation – i.e. its Gate 1 Offer will provide details on the reserved connection point, capacity, and connection date, conditional on the project meeting the Gate 2 Criteria and accepting a Gate 2 offer prior to the reservation expiry date.

Figure 2 summarises the examples scenarios for a project holding a Gate 1 agreement with Reservation (offshore) submitting a Gated Modification Application for a technology change / addition, where the changed project continues to qualify for Connection Point and Capacity Reservation. A similar process would apply if the reservation was made for an onshore project. For projects holding a Gate 1 agreement with Reservation, noting that project-specific reservation has a finite term (until the Gate 2 Criteria must be met), a technology change may also result in the expiry dates for the Reservation being reviewed There could also be a loss of Reservation within the Modification Offer for the project as a consequence of a material technology change.

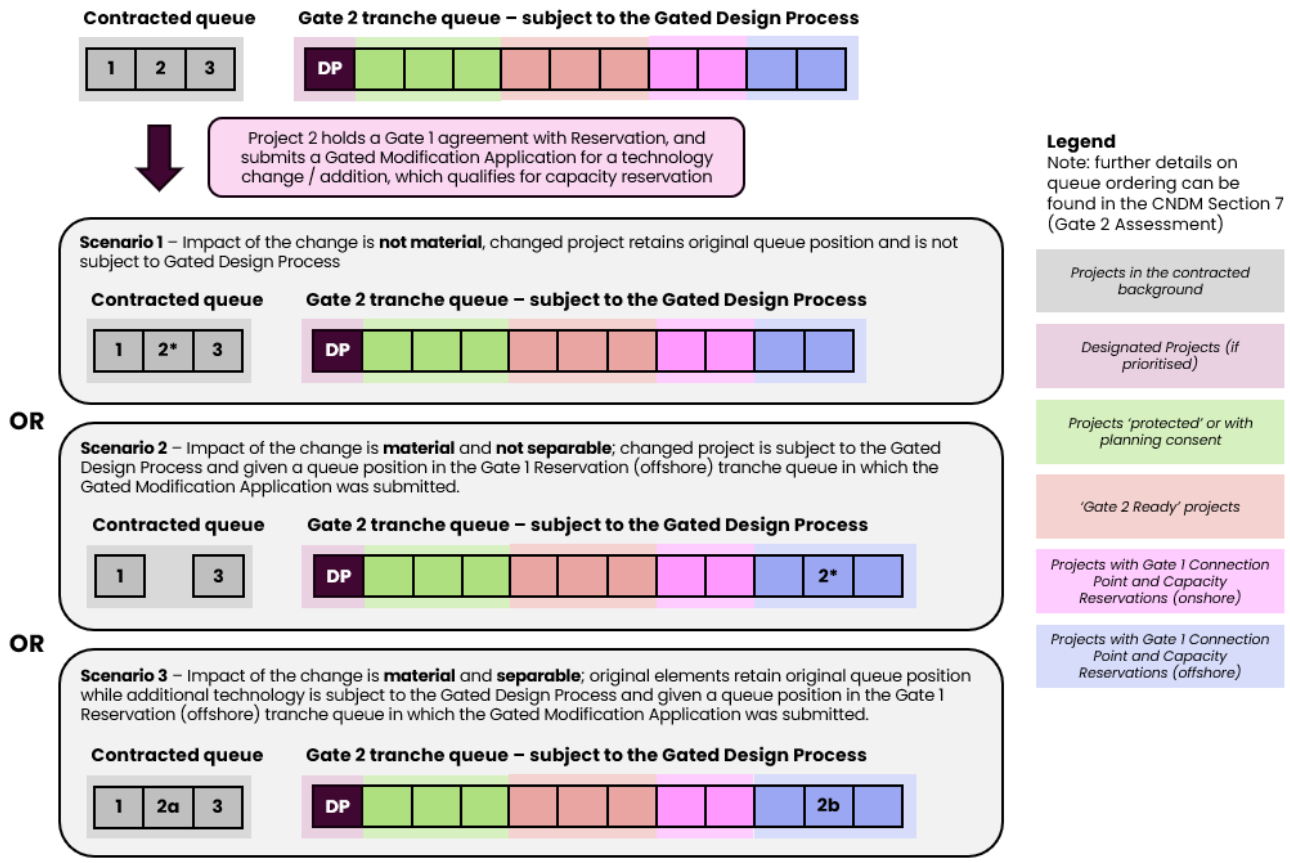

Figure 2: Example scenarios for a project holding a Gate 1 agreement with Reservation (offshore) submitting a Gated Modification Application for a technology change / addition which continues to qualify for Connection Point and Capacity Reservation

The treatment for technology changes requested by projects holding a Gate 1 agreement with Reservation is the same as that for projects holding a Gate 2 Agreement. However, where the technology change is deemed 'material' (i.e. Scenarios 2 and 3 in Figure 2 above), the changed Gate 1 project, or changed element of the Gate 1 project, will be given a relative queue position within the Gate 1 onshore or offshore reservation groupings in which the Gated Modification Application was submitted. As per the CNDM Section 7.10, projects in these groupings will be ordered as determined by NESO, with consideration given to the requested connection date of projects that have applied to Gate 1.

The Gated Design Process as described in the CNDM will then be followed to determine the respective connection date(s) for the changed project.

If a Gate 1 project holding reserved capacity requests a technology change in relation to a technology that does *not* qualify for capacity reservation, the changed project would

be offered a Gate 1 agreement without Reservation for the whole / separate part of the project depending on the change with no capacity reservation.

6.3.2 Projects holding a Gate 1 Agreement without Reservation

As per the Gated Modification Guidance, a technology change Modification Application for a Gate 1 project without Reservation is not considered Gated and can therefore be submitted at any time; indicative connection dates and connection sites would be offered for the changed project as per any Gate 1 agreement.

7 Ongoing Guidance Maintenance

This guidance will be reviewed and updated (if required) at least once per annum.

8 Terminology

Acronym / Key Term	Description
ATO	Affected Transmission Owner
BCA	Bilateral Connection Agreement
BEGA	Bilateral Embedded Generation Agreement
BELLA	Bilateral Embedded Licence Exemptible Large Power Station Agreement
BESS	Battery energy storage site
CCGT	Closed cycle gas turbine
CPA	Construction Planning Assumptions
CUSC	Connection and Use of System Code
DNO	Distribution Network Operator
ENA	Energy Networks Association
MW	Megawatt – a unit of power equal to one million watts
NESO	National Energy System Operator
NETS	National Electricity Transmission System
OCGT	Open cycle gas turbine
STC	System Operator Transmission Owner Code
SQSS	Security and Quality of Supply Standard
TEC	Transmission Entry Capacity
TO	Transmission Owner