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| Workgroup Consultation | | | |
| **GSR029: Review of Demand Connection Criteria to Align with EREC P2/7**  **Overview:** This modification is proposed to review the demand connection criteria in Section 3 of the NETS SQSS to resolve the discrepancies with EREC P2/7. This includes the review of the group demand definition and demand security contribution assumptions from embedded generation, demand side response, storage and active network management schemes. | | **Modification process & timetable**    **Proposal Form**  28 June 2022  **Workgroup Consultation**  11 March 2024 - 03 April 2024  **Workgroup Report**  30 April 2024  **Code Administrator Consultation**  13 May 2024 - 10 June 2024  **Draft Modification Report**  02 July 2024  **Final Modification Report**  23 July 2024  **Implementation**  TBC  **1**  **2**  **3**  **4**  **5**  **6**  **7** | |
| **Have 5 minutes?** Read our [Executive summary](#_Executive_summary_1)  **Have 40 minutes?** Read the full [Workgroup Consultation](#_Why_change?)  **Have 90 minutes?** Read the full Workgroup Consultation and Annexes. | | | |
| **Status summary:** The Workgroup are seeking your views on the work completed to date to form the final solution(s) to the issue raised. | | | |
| **This modification is expected to have a: High impact**  on Transmission Owners, Distribution Network Operators | | | |
| **Governance route** | |  | | --- | | Standard Governance: This modification has been assessed by a Workgroup and Ofgem will make the decision on whether it should be implemented. | | | |
| **Who can I talk to about the change?** | **Proposer:** Fiona Williams, National Grid ESO  [Fiona.Williams@nationalgrideso.com](mailto:Fiona.Williams@nationalgrideso.com)  XXXXXX | | **Code Administrator** **Chair**: Milly Lewis, National Grid ESO  milly.lewis@nationalgrideso.com  07811036380 |
| **How do I respond?** | Send your response proforma to[[box.sqss@nationalgrideso.com](mailto:box.sqss@nationalgrideso.com)](mailto:grid.code@nationalgrideso.com) **by 5pm on 03 April 2024** | | |

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# Executive summary

This modification proposes to review the demand connection criteria in Section 3 of the NETS SQSS in order to resolve the discrepancies with EREC P2/7, reviewing the definitions of group demand and demand security contribution assumptions from embedded generation, demand side response, storage and active network management schemes.

What is the issue?

The discrepancies between the demand security criteria applicable in the transmission system defined in NETS SQSS Section 3 and the applicable distribution network planning criteria in Engineering Recommendation P2/7 (EREC P2/7).

What is the solution and when will it come into effect?

**Proposer’s solution:** The Proposer suggests the change of definition of group demand in clause 3.5, to either gross demand or net demand plus the output of small, medium and large power stations, and the introduction of the definition of flexible demand. The revision of the background conditions ( clause 3.7.3 and 3.7.4) to make clear the need for the demand security contributions from embedded small and medium power stations, Demand Side Response, Energy Storage and Active Network Management scheme to be considered. Replace the effective contribution of embedded large power stations to group demand with the reference to EREP 130 Issue 3 2019 Annex D. Consider introducing the definition of electricity storage plant.

**Implementation date:** TBC

What is the impact if this change is made?

This modification will ensure a consistency on the requirements for demand connection applied by TO and DNO, facilitating the efficiency of the investment on their networks and benefit the end consumers. By updating the definition of group demand and reviewing the security contributions this modification will ensure the right level of security of supply to costumers, allow more efficient connection of storage and support the journey to net-zero.

Interactions

There are interactions with [GC0138: Compliance process technical improvements (EU and GB User)](https://www.nationalgrideso.com/industry-information/codes/gc/modifications/gc0138-compliance-process-technical-improvements-eu-and)

What is the issue?

There are discrepancies between the demand security criteria applicable on the transmission system, as defined in NETS SQSS Section 3, and the applicable distribution network planning criteria as specified in Engineering Recommendation P2/7 (EREC P2/7). This could lead to investment being neither coordinated nor efficient.

## Why change?

The DNO demand connection standard, Engineering Recommendation P2 (EREC P2/7), has already undergone a review - some revisions have been made and further revisions are planned. This has resulted in three main discrepancies between Section 3 of the NETS SQSS and EREC P2/7:

* The NETS SQSS defines the size of a demand group based on the net transmission system demand. EREC P2/7, on the other hand, defines that size based on the total gross demand. This means that the level of the demand security that a DNO is required to provide could be different to what the transmission system is designed to provide, particularly in groups with a significant capacity of embedded small power stations.
* In providing demand security, EREC P2/7 allows the DNOs to rely on commercial contracts with distributed energy resources and on contributions from embedded small power stations. However, NETS SQSS Section 3 does not allow the use of commercial contracts and only takes the output of embedded small power stations to the extent that it reduces the group demand. This could lead to a discrepancy between the transmission network capacity and the distribution network capacity.
* The assumptions on the contribution from embedded large power stations towards demand security are different between the NETS SQSS Section 3 and those used in EREC P2/7 - with the latter referring to the Guidance on the Application of the Engineering Recommendation P2 (EREP 130).

These discrepancies could undermine the ability of both the TOs and DNOs to ensure that investment on their networks is coordinated, economic, and efficient. It could also have the unintended effect of significantly delaying the connection of embedded storage – a risk that has been raised by stakeholders on several occasions. Therefore, it is necessary to revise the NETS SQSS demand connection criteria to ensure coordinated and consistent investment at the point of interface between the transmission and distribution systems.

It is noted that DNO can carry out Cost Benefit Analysis (CBA) to demonstrate compliance with EREC P2/7 when the remedial works indicates that the options are not economically justifiable and/or do not align with its asset management strategy. It is not intended to adopt the same approach in SQSS Section 3 as this option should only be exercised under a strict set of occasions for specific demand groups. The number of GSPs in the transmission network is manageable through the normal derogation process in case similar circumstances occur.

This proposal will also ensure that the NETS SQSS is fit for a future energy system in which electricity is expected to play an increasing role in space heating and transportation. Embedded generation capacity and storage are expected to grow further, and consumers are increasingly interested in playing a role in the energy market via the provision of flexibility services. This will be achieved via:

* Ensuring that growth in demand is not masked by the growth in embedded generation. This will ensure that the right level of demand security is always maintained.
* Ensuring that opportunities offered by embedded generation, storage, and flexible demand are taken advantage of - such that some of the future investment is offset where it is economic to do so while not undermining the security of supply.
* Address any perceived blockers on connecting storage plant.

What is the solution?

## Proposer’s solution

Subject to a satisfactory assessment of the impacts of such a change, it is proposed to:

* change the definition of group demand in clause 3.5 to either the gross demand or net demand plus the output of small, medium and large power stations and flexible demand;
* introduce a definition of flexible demand;
* revise the background conditions specified in 3.7.3 and 3.7.4 to make it clear that the demand security contribution from embedded small and medium power stations, Demand Side Response, Energy Storage and Active Network Management scheme need to be considered;
* remove the effective contribution of embedded large power stations to demand group defined in Table 3.2 and replace it with the reference to EREP 130 Issue 3 2019 Annex D approaches for assessing the contribution from Non-Contracted DG to System Security as a guidance of assessment;
* to consider introducing a definition of electricity storage plant, which should be a subset of power stations, and clarify how its contribution to the group demand should be taken into account.

The proposal does not include an exhaustive list nor examples of what would contribute towards the gross demand value that is expected to be provided by the DNO as a part of their standard planning data. This is expected to take into account all the elements specified in EREC P2//7.

The proposal includes a definition for electricity storage plant and a definition of the group demand. It elaborates on how demand taken by such plant is to be taken into consideration when assessing the group demand. It does not include specific details on how to assess the contribution of such plant towards demand security as these are expected to be treated in the same manner as any other power station. This is not an essential part of this modification proposal but is likely to provide a much-needed clarity on storage connections within the context of Section 3 of the NETS SQSS.

Changing the group demand definition could potentially cause demand groups to move between two different categories. This could lead to a situation where the transmission capacity of a particular demand group becoming no longer sufficient to meet the requirements of the NETS SQSS.

The proposal assumes that contribution from embedded small power stations, embedded medium power stations, distributed energy resources and flexible demand towards supply capacity are going to be specified by DNOs through normal planning processes. Contributions from large power stations on the other hand, are estimated by transmission licenses as per the current practice. This ensures that there will not be any double counting. The workgroup will need to decide whether to:

* adopt this assumption in their final proposal,
* consider another scenario where DNOs are responsible for specifying the contribution of embedded large power stations, or
* make provisions for transmission licensees to modify the assumptions provided by DNOs to take into account any information they have, e.g. by the virtue of a commercial agreement or an operational arrangement of a certain power station or flexible demand.

In all three cases, the workgroup will need to the scope of data sharing required and the most appropriate mechanism of sharing such data. The workgroup will also need to consider how is it that services could be procured by one party, e.g. DNOs, to support TOs compliance with the NETS SQSS.

It is suggested that DNO’s current assessment of contribution from power stations and flexible demand is only needed when there is still network deficiency after taking into account the network capacity, transfer capacity and capacity from contracted power stations and flexible demand. The workgroup will need to decide whether to:

* request the DNO to submit the data for the GSPs where such assessment has been carried out;
* request the DNO to establish the demand security contribution for all GSPs;
* or set up a process for TOs to workout network deficiency at certain GSPs and request the DNO to submit the relevant data.

Table 3.2 in SQSS specifies the effective contribution of embedded large power stations to demand group importing capacity in NGET’s transmission system. There isn’t similar requirement for SPT or SHET. This proposal seeks to replace Table 3.2 with the reference to RERP130 and introduce the aligned requirement on all three transmission areas. This reference will act as a guidance to assess the demand security contribution from power stations to achieve compliance to SQSS section 3. This is to ensure continuous alignment and consistent treatment of embedded generation amongst transmission and distribution licensees. The workgroup will need to consider whether to:

* adopt this assumption in the final proposal,
* adopt this assumption in the final proposal but specify the version of EREP130 so that any future changes will go through the NETS SQSS governance, or
* retain and update table 3.2 as appropriate.

The workgroup will need to advise on any changes that may be required to other codes in order to facilitate the implementation of this proposal. This is likely to include changes to the standard planning data in the Grid Code to facilitate data sharing between DNOs and the ESO. It may also include changes to the STC and CUSC.

Workgroup considerations

The Workgroup convened seven times to discuss the perceived issue, detail the scope of the proposed defect, devise potential solutions and assess the proposal in terms of the Applicable SQSS Objectives.

**Consideration of the proposer’s solution**

Workgroup agreed that a clear definition of Demand Group/ Flexible demand is needed and that a common resolution on how to deal with the demand security contribution should be agreed on, as it should not be left to the Network Operators alone to decide. Workgroup also suggested the need to specify the lower limit of what is referred to as smaller power stations – it was suggested that anything below 50MW for England and Wales, 30 MW for SPT area and 10MW for Geotransition areas is considered small.

The Proposer provided the Workgroup with a framework for Impact assessment and requested the feedback.

1. Change of the class of group demand and potential non- compliance due to the modification (net demand to gross demand) using two different methods shared with the Workgroup.
2. Demand security contribution assumptions from large power stations through their current practices and using the methodology in EREP 130.

Review Methodology for Security Contributions for Large Power Stations

The Workgroup went through the [Engineering Report (EREP) 130](http://www.dcode.org.uk/assets/files/Qualifying%20Standards/ENA_EREP_130_Issue%203_(2019).pdf) to discuss the three approaches for assessing the contribution from Non-Contracted Distributed Generation (DG) to System Security.

* **Approach 1:** The Workgroup discussed table ‘D.2.3 Recommended values for Persistence Time (Tm)’ [(page 45)](http://www.dcode.org.uk/assets/files/Qualifying%20Standards/ENA_EREP_130_Issue%203_(2019).pdf). Workgroup agreed that input from the Imperial College London report authors would be beneficial in order to clarify the methodology, rationale and assumptions behind the persistence times, and applicability to transmission.
* **Approach 2:** The Workgroup discussed how this approach used the concept of a ’capacity factor’ which due to the lack of available data there was a need for judgement to be applied when using the methodology.
* **Approach 3:** The Workgroup discussed the spreadsheet developed for assessing the security DG ([covered within the EREP 131 guidance document](http://www.dcode.org.uk/assets/uploads/ENA_EREP_131_Issue_2__2012_.pdf)).
  + For the calculation of the security contribution of Non-Contracted DG and Electricity Storage (ES) connections, Workgroup members raised concerns around the need to be clear if the forecast the security contribution is from existing and /or future generation.
  + The Workgroup agreed the input data which is required, and which party is best placed to access it currently and the new methodology needs to be established. In reviewing the spreadsheet, it appeared it was not designed for Grid Supply Point (GSP) level with only fields for up to 10 DG and ES connections.
  + The TOs are currently applying the [GSR008 Table 3.2](https://www.nationalgrideso.com/document/14736/download) page 22, but this only applies to NGET and not Scotland. From the TO perspective the export capacity is the issue more that security and Scotland does not have an equivalent.

Capacity outage and probability tables in the [(EREP) 130](http://www.dcode.org.uk/assets/files/Qualifying%20Standards/ENA_EREP_130_Issue%203_(2019).pdf) page 75, divide intermittent and non-intermittent generation. In the spreadsheet you need to add a demand and generation profile. In the summer there will be a different number of contributions with demand. Wind will need to be considered separately which can’t be done in the spreadsheet and therefore there are limitations

**Review Methodology for Security Contributions of Storage**

The Workgroup will consider how an ES connection can provide a security contribution where it is creating the demand problem. It might it be reasonable to assume that a BESS will be exporting at the 'traditional' peak even if it is creating a new peak and should consider BESSs as zero contribution unless contracted.

The Workgroup discussed that future code modifications may need to be considered for BESS to provide load curve/operational profiles, and control mechanism for all BESS over a given size. There needs to be clarity on what is contracted and non-contracted, as well as how to identify diversity in storage.

**Imperial College London (ICL) Report queries**

It was mentioned that Approach 3 has potential, but the points need to be taken forward. Key messages were that the methodology is considered by ICL to be suitable for assessing large power stations and energy storage (as long as the correct input is used).

However, the study did not use generators that have operational limits and there would need to be additional guidance for Balancing Mechanism (BM) connected generators. If NGET or ESO write in the code that networks operators should apply EREP 130 then that would mostly likely happen. It needs to be considered if this is actually the correct approach for National Grid. Application 1 and 2 were decided that they are not relevant for power stations.

It was considered if the demand security contribution data submission process was suitable. The TOs would run the assessment agreed in the SQSS according to the Week 24 data submission, it will be heavily dependent on the group demand data received. It should identify the gaps of demand security required for TOs and the correct input such as Persistence time, and what time of year the security contribution would be required. Profiles used would need to be gross for demand profiles and net for everything else. However, individual DNOs don’t always have that information. Could be that the majority of cases can be easily implemented, with exceptions having separate data and conversations.

There are two main objectives of the modification:

1. Align the NETS SQSS with P2 in relation to the use of gross demand
2. Ensure that demand side management options and security contribution from embedded generation is taken into account where necessary
3. Ensure that there is a consistent approach across DNO and ESO re treatment of import from Electricity Storage (typically being the single most significant demand in a demand group)

## Objective 1 Align the NETS SQSS with P2 in relation to the use of gross demand

### NETS SQSS

The NETS SQSS V2.5 of the NETS SQSS define the Group Demand as a value submitted by Network Operators and Non-Embedded Customers in accordance with the Grid Code. It does not explicitly state whether this is the Gross Demand or the Net Demand. It then, in Clause 3.5, requires that Transmission Licensees use, for the purpose of assessment of connection capacity requirements, the demand level that would be supplied directly from the National Electricity Transmission System and by Large Power Stations embedded within the Network Operator’s and Non-embedded Customers’ System. It also specifies, in Clause 3.6, that diversity in power flows associated with demand and generation may be taken into account where appropriate when calculating Group Demand.

With Network Operators and Non-embedded Customers being the only party capable of identifying what the gross demand consumed within their system is, it will be necessary for them to provide this data as a part of their annual data submissions as required by the Planning Code. Transmission Licensees will be using the data directly as provided in their assessment without the need to process this data. This would mean that Clause 3.5 is redundant as Transmission Licensees would no longer need to do any calculation.

Transmission Licensees may, however, need to aggregate data related to multiple GSPs when looking at larger Demand Groups. Therefore, it would be necessary to maintain the requirements to take this diversity into account. However, diversity would be applied directly to the gross demand itself rather than to the power flows associated with net demand and embedded generation output as per the current clause 3.6. In order to undertake this aggregation correctly 365x24 data sets of half hourly data would be required. Provision of such data would significantly increase the volume of Grid Code week 24 submissions and the Workgroup proposed a workaround which is described later in this section.

The Workgroup proposes that

* Clause 3.5 is deleted as the Transmission Licensees will no longer need to apply it.
* Clause 3.6 is deleted for simplicity with the definition of the Group Demand updated to convey the message about diversity.
* The definition of Group Demand is updated to become

Group Demand In accordance with the Grid Code, for a single *GSP* or *OSP*: The forecast maximum demand for the *GSP* or *OSP* provided in accordance with the requirements of the Grid Code by the *network operators* or *non-embedded customers* taking demand from the *national electricity transmission system*. For multiple *GSPs* or *OSPs*: The sum of the forecast maximum demands for the *GSPs* or *OSP*s provided by the *network operators* or *non-embedded customers* taking demand from the *national electricity transmission system* after accounting for demand diversity

 The workgroup noted that the Group Demand definition references both Grid Supply Points and Offshore Supply Points. However, this should not cause any unintended consequences as the Group Demand at an Offshore Supply Point is estimated as the demand at an Offshore Power Station with the generation output being set to zero. i.e. The Group Demand at an Offshore Supply is already equal to the maximum gross demand at the Offshore Power Station.

### The Grid Code

The data relevant for NETS SQSS Section 3 studies are covered under PC.A.4.3 of the Planning Code. This clause specifies the points in time that the Network Operator or the Non-Embedded Customer is required to provide data for in their submissions (PC.A.4.3.1) and the details of the data that is required to be submitted (PC.A.4.3.2).

To ensure that the Network Operator or the Non-Embedded Customer submits the data at the time of the maximum gross demand, PC.A.4.3.1 would need to include this point in time. This could either supersede or be in addition to PC.A.4.3.1 (a) which currently require submission of data relevant to the point of the maximum net transmission demand.

The details of what constitutes demand and the basis of calculating this demand level needs to be included in a revised PC.A.4.3.2.

The Workgroup proposes that a Grid Code workgroup considers

* Either adding a new Clause PC.A.4.3.1 (f) or replacing the existing Clause PC.A.4.3.1 (a) so that it refers to the time at which the maximum demand would be supplied from the Network Operator’s System or utilised within a Non-Embedded Customer’s System.
* Modifying Clause PC.A.4.3.2 to ensure consistency with the demand definition in P2/8 as shown below:

The Workgroup noted that PC.A.4.2 deals with demand profiles across the whole Network Operator’s system. Although this demand profile is not relevant to this modification, there may be a merit in aligning PC.A.4.2 with PC.A.4.3 such that profiles of gross demand are also provided.

The Workgroup proposes that a Grid Code workgroup also considers

* Aligning PC.A.4.2.1 with PC.A.4.3.1 (text not included at the moment)
* Aligning PC.A.4.2.4 with PC.A.4.3.2 (text not included at the moment)

PC.A.4.3.1 Forecast **Demand** (**Active Power**) and **Power Factor** (values of the **Power Factor** at maximum and minimum continuous excitation may be given instead where more than 95% of the total **Demand** at a **Connection Point** is taken by synchronous motors) to be met at each **Connection Point** within each **Access Group** is required for:

1. the time of the maximum **Demand** (**Active Power**) at the **Connection Point** (as determined by the **User**) that in the **User's** opinion could reasonably be supplied from or utilised within the **User System**

PC.A.4.3.2 All forecast **Demand** specified in PC.A.4.3.1 shall:

1. be that supplied from or utilised within the **User System** with appropriate allowance for diversity. This is the Demand that would be imposed on the **National Electricity Transmission System** in the case of:
2. **Embedded Power Stations, Customer Generating Plant,** and imports across **Embedded External Interconnections**, including **Embedded** installations of direct current converters which do not form a **DC Converter Station**, **HVDC System** and **Embedded DC Converter Stations** and **Embedded HVDC Systems** being not available;
3. any means of suppressing **Demand** such as **Demand Response** Services, **Suppliers’** time of use tariffs, and **Network Operator’s** price signals being not in use, where known by the **Network Operator**;
4. increase in **Demand** following re-energisation of the **User System** compared to the **Demand** level expected if no de-energisation occurred; and
5. any other factors, including the effects of cold load pickup, that would in the **User’**s reasonable opinion result in an increase to the **Demand** imposed on the **National Electricity Transmission System.**

~~remaining after any deductions reasonably considerexd appropriate by the~~ **~~User~~** ~~to take account of the output of all~~ **~~Embedded Small Power Stations~~** ~~and~~ **~~Embedded Medium Power Stations~~** ~~and~~ **~~Customer Generating Plant~~** ~~and imports across~~ **~~Embedded External Interconnections~~**~~, including~~ **~~Embedded~~** ~~installations of direct current converters which do not form a~~ **~~DC Converter Station~~**~~,~~ **~~HVDC System~~** ~~and~~ **~~Embedded DC Converter Stations~~** ~~and~~ **~~Embedded HVDC Systems~~** ~~and~~

any such ~~deductions~~ allowances should be separately stated;

1. include any **User's System** series reactive losses but exclude any reactive compensation equipment specified in PC.A.2.4 and exclude any network susceptance specified in PC.A.2.3;
2. be based upon **Annual ACS Conditions** for times that occur during calendar week 44 through to calendar week 12 (inclusive) and based on **Average Conditions** for calendar weeks 13 to calendar week 43 (inclusive), both corrections being made on a best endeavours basis;
3. (d) reflect the **User’s** opinion of what could reasonably be supplied from or utilised within the **User System** ~~imposed on the~~ **~~National Electricity Transmission System~~**~~.~~

### Issues that need addressing

* + - 1. Aggregation of individual Users into larger demand groups

The current practice for Connection Points supplying multiple Network Operators and Non-Embedded Customers is that at week 6 the date and time of the maximum net demand at the site, as determined by the Electricity System Operator, is notified to the different parties connected at this site. These parties would then submit the demand data corresponding to the times specified by the Electricity System Operator.

However, as it is proposed to change the group demand definition from net demand to gross demand, the ESO wouldn’t have the information to estimate the time of the maximum gross demand for the combined site. Hence there will be a need to require Network Operators and Non-Embedded Customers to provide detailed gross demand profiles to facilitate this aggregation.

In the first instance, Transmission Licensees could ignore diversity and assess compliance against a Group Demand for the aggregate Demand Group that is equal to the sum of the Group Demands for individual Demand Groups. This would constitute a worst-case scenario.

If non-compliance is identified and if there is a potential need for reinforcement, The Company would request load profiles from the Network Operator and or Non- Embedded Customer for the individual Demand Groups to perform the aggregation.

To facilitate this, the Workgroup proposes the following additions to require the provision for gross demand profiles at one or more Grid Supply Points for one or more days.

The workgroup noted that that there could be situations where the submission of the demand profile for 365 days would be necessary to do the aggregation. In such case, the notification under PC.A.4.3.6 would need to refer to the whole year.

PC.A.4.3.1 :

:

In addition, forecast daily **Demand** (**Active Power**) profiles in respect of a **Connection Point** notified in accordance with PC.A.4.3.6 is required for days notified in accordance with PC.A.4.3.6:

PC.A.4.3.2 :

:

1. in the case of forecast daily **Demand** profiles for **Connection Points** and dates notified in accordance with PC.A.4.3.6, be such that the profiles comprise average **Active Power** levels in 'MW' for each time marked half hour throughout the day.

PC.A.4.3.6 No later than calendar week 17 each year, **The Company** shall notify each **Network Operator** and **Non-Embedded Customer** in writing of the following, for the current **Financial Year** and for each of the following seven **Financial Years**, which will, until replaced by the following year’s notification, be regarded as the relevant specified days and times under PC.A.4.2.1:

1. any **Connection Point** that **The Company** requires the **User** to submit forecast daily **Demand** (**Active Power)** profiles for specified dates; and
2. the dates for which **The Company reasonably** requires that **User** submits a forecast daily **Demand** (Active Power) profile for the specified **Connection Points**
   * + 1. Storage

Although embedded Large Power Stations affect the net demand, its effect is counteracted by the addition of their output to the net demand in accordance with Clause 3.5.2 of the NETS SQSS. This means that the connection of an embedded Large Power Station has no impact on the Group Demand. Applying the same logic to storage, the connection of an embedded Large storage plant will have no impact on Group Demand.

The proposal to delete Clause 3.5 does not alter this position in relation to Large Power Stations. The drafting of the Grid Code extends that position to embedded Small/Medium Power Stations. Hence, an outcome of this proposal would be that the demand security level required for a specific Demand Group would not be reduced due to the demand being masked by the presence of a significant capacity of embedded Small/Medium Power Stations within the Demand Group.



So, similar applying the same logic on storage, and treating charging as negative output, storage would have a neutral contribution to the Group Demand. This would mean that storage would not affect the size of the Demand Group and would not warrant an increased level of security of supply. However, it does not negate the need to reinforce the Grid Supply Point to ensure that storage can operate as required.



One limitation is that, unlike an embedded Small/Medium Power Station that contains generation only, the operation of storage following an outage could affect the Network Operator’s ability to restore demand. Therefore, measures would need to be put in place to ensure that storage does not take demand in situations where that could affect the ability of the Network Operator to meet the operational demand security requirements.

PC.A.4.3.2 (a) :

It should not include any export over **Embedded External Interconnections** or **Active Power** supplied to **Embedded Electricity Storage Units** unless the **Network Operator** or the **Non-Embedded Customer** has no means to reduce this export over **Embedded External Interconnections** or **Active Power** supplied to **Embedded Electricity Storage Units** to zero;

The workgroup notes that there is a requirement on all Generators with Type A, B, C, and D Power Stations to be able to accept an instruction issued by the Network Operator to disconnect from the system. Hence, provided that the Network Operator have the communications infrastructure to allow sending this instruction, most of new storage plant would have no contribution to the Group Demand.

Demand connected at storage sites:

Some storage sites would be taking demand from the Network Operator’s system for purposes other than charging their energy storage. This demand would need to be treated separately as any other consumer’s demand. If both elements are not metered separately, Network Operators may need additional data submissions from Storage sites.

A Workgroup member raised the concern regarding the energy not supplied incentive and how we ensure TOs are not penalised during loss of supply events. This needs further investigation.

A diagram of a group of power stations

Description automatically generated

## Objective 2 Ensure that demand side management options and security contribution from embedded generation is taken into account where necessary

### The NETS SQSS

Version 2.5 of the NETS SQSS allows the use of security contribution from embedded Large Power Stations to meet the demand security criteria. It factors contribution from embedded Small/Medium Power Stations implicitly because they reduce the gross Group Demand. It does not allow any security contribution from any flexible demand.

With the implicit security contribution of embedded Small/Medium Power Stations removed as a part of achieving Objective 1, their security contribution will need to be explicitly allowed and calculated in a manner that is similar or equivalent to the security contribution from embedded Larger Power Stations. To achieve this, the references to “Large Power Station” in Section 3 will need to be updated to refer generically to “Power Station”

For flexible demand, as this is currently allowed to be used by Network Operators, the NETS SQSS needs to be updated to define what Flexible Demand is and to ensure where security contribution from a Power Station is referenced, the clause also refers to Flexible Demand

Flexible Demand A subset of demand in a *demand group* associated with customers who agree to change their demand at a given point in time in response to an instruction in accordance with an agreement with a Network Operator. This excludes any changes to demand following an *emergency instruction*.

The workgroup also proposes to modify clauses 3.13 and 3.14 so that the calculation of demand security contributions refer to embedded Power Stations and flexible demand rather than embedded Large Power Stations only.

3.13 Where network assets are insufficient to meet the security requirements, it is necessary to assess the contribution to security from *~~large~~ power stations* connected at either the transmission connection interface or embedded within the *Networks Operator’s* system and any *flexible demand* connected at either the transmission connection interface or within the *Networks Operator’s* system. This will identify whether the contribution to security ~~of the~~ *~~large~~* from *power stations* connected to and/or *flexible demand supplied from* the network has the potential to meet any deficit in system security from network assets.

3.14 The combined contribution to security from *~~large~~ power stations* and *flexible demand* shall never have a greater impact on system security than the loss of the largest circuit infeed to the group. The contributions from embedded *~~small~~* ~~and~~ *~~medium~~ power stations* and *flexible demand* provide additional capacity to enable the supply of demand which may not otherwise be met following a *secured event*, but shall not replace the requirement for system connection. The assessment of contribution of generation to group security will therefore consider;

3.14.1 the generation *annual load factor;*

3.14.2 the availability of generation under outage conditions;

3.14.3 the fuel source availability, i.e. whether energy is continuous, stored, storable or predictable;

3.14.4 common-mode failure mechanisms such as common fuel source, connections or plant stability / ride-through capability;

3.14.5 capping of generation contribution in the event that the generation contribution is dominant with respect to circuit infeed capability

The assessment of the contributions from different power stations and from flexible demand would need to be shared between Transmission Licensees and Network Operators. The main two options would be that

* Transmission Licensees keep the responsibility of estimating the contribution from embedded Large Power Stations and from Power Stations at the interface point as per the current arrangement, or
* Transmission Licensees keep the responsibility of estimating the contribution from Power Stations at the interface point and transfer the requirement to assess the contribution from embedded Large Power Stations to Network Operators

In both cases, Network Operators will be responsible for the provision of any security contributions from embedded Small/Medium Power Stations and flexible demand.

The text proposed for the 1st option is:

3.15 ~~The effective contribution of~~ *~~large power stations to demand group~~* ~~importing capacity shall not exceed the levels indicated in Table 3.2 while~~ While taking due account of the considerations detailed in paragraph 3.14, the effective contribution to security of *demand group* shall be:

3.15.1 in the case of *small power stations* and *medium power stations* embedded within the *network operator’s* systemand in the case of *flexible demand*, as declared by the *network operators* in accordance with the requirements of the *grid code*;

3.15.2 in the case of *large power stations* embedded within the *network operator’s* system or *power stations* connected at the transmission interface point, as estimated by *onshore transmission licensees*. Guidance on the estimation of such contribution is available in Annex D of Engineering Report 130 Issue 3 2019.

The text proposed for the 2nd option is:

3.15 ~~The effective contribution of~~ *~~large power stations to demand group~~* ~~importing capacity shall not exceed the levels indicated in Table 3.2 while~~ While taking due account of the considerations detailed in paragraph 3.14, the effective contribution to security of *demand group* shall be:

3.15.1 in the case of *power stations* embedded within the *network operator’s* systemand in the case of *flexible demand*, as declared by the *network operators* in accordance with the requirements of the *grid code*;

3.15.2 in the case of *power stations* connected at the interface point, as estimated by *onshore transmission licensees*. Guidance on the estimation of such contribution is available in Annex D of Engineering Report 130 Issue 3 2019.

In either case, the Grid Code would need to be modified to ensure that all parties have the data they require to do the assessment.

### Issues to be addressed

* + - 1. Estimating the security contribution from embedded generation and flexible demand

1. Flexible demand and power stations that are subject to a demand security contract:

The value of this security contribution will be equal to the contracted level.

1. Embedded small and medium power stations not subject to a demand security contract:

EREP 130 provides several options for the estimation of the security contribution from embedded small and medium power stations.

1. Embedded large power stations and power stations connected at the interface point:

The same options in EREP 130 available for small and medium power stations could be used to estimate the contribution from embedded large power stations. However, as the number of these power stations is reasonably limited the use of the spreadsheet (EREP131) is probably the most appropriate methodology for these power stations.

1. Storage

There is currently not enough information related to how storage, other than pumped storage, provide energy arbitrage. This is due to the fact that

* + - battery storage systems are relatively new to the energy market, and
    - the majority of battery storage systems seem to focus more on the ancillary services rather than on energy trading.

Due to this, security contribution from battery storage systems should only be considered where the provision of such service is guaranteed by a contract with a view to review this position in the future as more data becomes available.

|  |  |  |  |
| --- | --- | --- | --- |
| Topics | ICL comments | Comments | Status |
| Impact of BM or other services | Approach 3 is still applicable if the right input to the spreadsheet can be produced.  Tolerance level can be adjusted to reflect the confidence in the assessment. | AMC concerns / conclusions  1. Approaches 1 and 2 are unsuitable  2. Approach 3 is probably OK to use but there is a need to carry out some assessment to see of the expected output from a large power station which is a BM unit is materially different compared to a large power station operating without BM instructions. NGESO can instruct a BM Unit to operate below or above its preferred output  3. Guidance is required on the choice of Tm. This will need to come from the TO via the ESO.  4. Guidance is provided on the selection of the time of year eg winter or mtce period peak. This will need to come from the TO via the ESO  5. Guidance is required on the p(security contribution can be delivered). This can be adjusted by tweaking some of the parameters. Guidance on this will need to come from the TO. How material is this factor. |  |
| **Approach 3 for energy storage** | It is suitable for non-contracted energy storage  Similarly, it still can produce valid results with a particular generation profile representing the behaviour of storage for a particular period of time. | AMC concerns / conclusions  1. In EREP 130 ‘contracted’ is defined as being contracted by the DNO provide a security service. Clearly this definition is not appropriate n a SQSS context  2. There needs to be more thought as to what ‘contracted’ and ‘non contracted‘ means in the context of applying EREP 130 to generation and also to BESS.  3. Need to consider the approach in relation to all the ‘ancillary’ services that NGESO contract for and whether they may influence the natural behaviour of the BESS |  |
| Aggregation of generators | Could be grouped by types and aggregated together.  Potential alternative to update the spreadsheet to accommodate more generators. | AMC concerns / conclusions  1. Guidance is required on the grouping of generators if there are >10 that need to be assessed  2. Guidance is required on the treatment of the net/gross demand associated with the generation which is not included in the security assessment. ICL have provided some thoughts but this needs to be clarified  3. What should the deminimis value be for a security assessment. EREP 130 is 5%. Is this reasonable. For a GSP where there is a security concern the demand will be at least 100MW, so the deminimis size will be 5MW.  4. Would increasing the numbers of generators that can be accommodated in the spreadsheet help? |  |
| How to consider BESS import and export demand security contribution | It could be considered separately, and that accuracy would be within data and asset tolerances. If it is considered together, within EREP 131, a carefully crafted profile for contracted DSR might be potentially a way forward. | AMC concerns / conclusions  1. I note that slide says ‘could’ – guidance is required as to how the security contribution from BESS Import and BESS export should be considered  2. This may be complicated where there are multiple parties involved.  3. In both cases the security contribution is very likely to be based on the terms of the ‘contract’. If this is a contact between the ESO and the BESS, then there will need to be an obligation for the ESO to provide details of this (as part of the week 24 process?) to the DNO so that they can do the assessment |  |
| Tm consideration for BESS | Contribution could be 100% until Tm is equal to the rated storage duration (Tr). Increasing Tm contribution drops to Tr/Tm, e.g., for Tm=2\*Tr contribution would be 50% | AMC concerns / conclusions  1. I note that slide says ‘could’ – guidance is required as to how the security contribution from BESS export should be considered |  |
| EREP 130 in general |  | • I think that there is a need to walk through EREO 130 to think about how it would / could be applied to SQSS |  |

* + - 1. Data exchange required to ensure that the assessment of contribution towards demand security takes place correctly and in a timely manner.

There are different data issues depending on whether the security contribution from large generators is assessed by Transmission Owners or Network Operators.

Assessment by Transmission Owners:

These are likely to include assessment of security contributions by power stations connected at the interface point. The data required for this assessment is

1. Date and Time
2. Location
3. Shortage of demand security
4. Persistence time (Tm)
5. Generation output
6. Demand profile

All this data is available for Transmission Owners except for:

1. Generation output: This are available on request from the ESO
2. Demand profile: This will need to be requested in accordance with the proposed new PC.A.4.3.6 and provided by Network Operators in accordance with the proposed modified PC.A.4.3.1.

Assessment by Network Operators:

These are likely to include assessment of security contributions from power stations other than power stations connected at the interface point. The data required for this assessment is exactly the same as that required by Transmission Owners.

However, Network Operators will need to be notified of the following by NGESO:

1. That they need to do a generation security assessment at a specific GSP
2. All the data required for the assessment except for demand and generation profiles as these are likely to be already available to them
3. The level of security contribution required
4. The level of the maximum security contribution that will be considered.

Following the assessment, Network Operators will need to submit the output of the assessment

The proposal is to cover this assessment under a new Clause PC.A.4.8 in the Grid Code Planning Code

PC.A.4.8 Connection Point Demand Security Resources Available (Active Power)

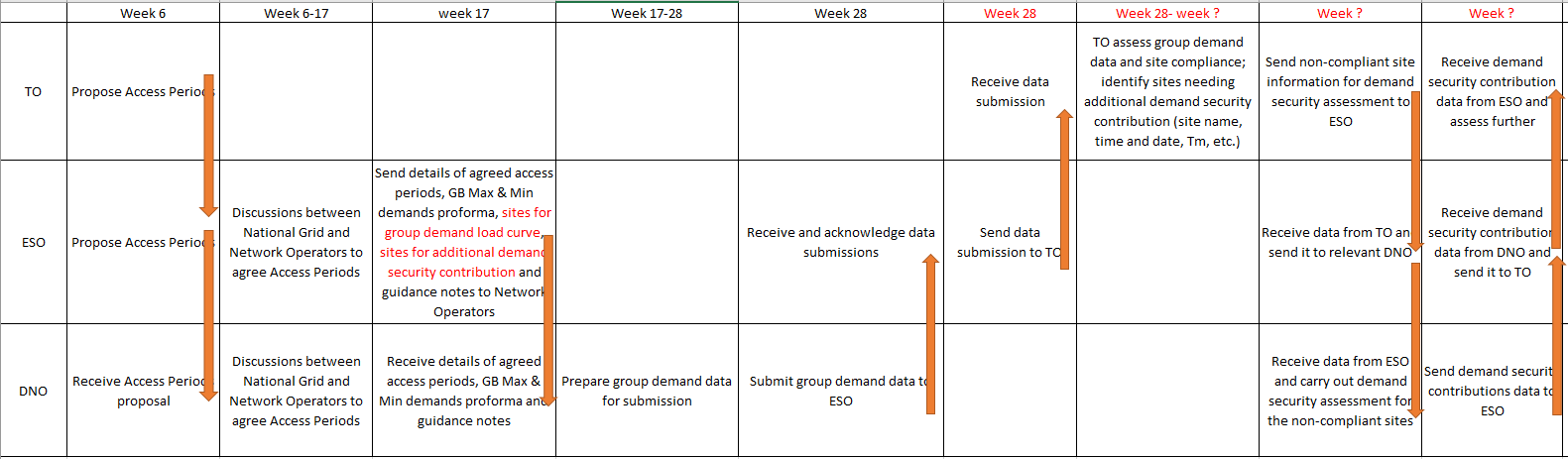
PC.A.4.8.1 Any resources available within the **Network Operator**`s **User System** that could be considered when assessing compliance with the demand connection capacity requirement criteria for the **Connection Point** as defined in the **NETS SQSS** including:

for all **Connection Points**,

1. the **Demand** (**Active Power**)capacity that could be supplied from a different **Access Group** immediately, within 60 seconds, within 15 minutes, and within 3 hours following an instruction from **The Company** to the **Network Operator** and
2. the **Demand** (**Active Power**) that could be either reduced or supplied by P**ower Stations** embedded within the **User System** at the **Connection Point** immediately, within 60 seconds, within 15 minutes, and within 3 hours following an instruction from **The Company** to the **Network Operator**; and
3. For all **Connection Points** notified by **The Company** in accordance with PC.A.4.8.2, these resources shall also include the **Demand** (**Active Power**) that is likely to be supplied from **Power** **Stations** embedded within the **User System** at the **Connection Site** excluding any **Power Station** that is considered under PC.A.4.8.1 (b) as assessed by the **Network Operator** in the case of embedded **Small Power Stations** and embedded **Medium Power Stations**,in accordance with **EREP 130** of the **Distribution Code** and, in the case of embedded **Large Power Stations**, in accordance with **EREP 131** of the **Distribution Code.**

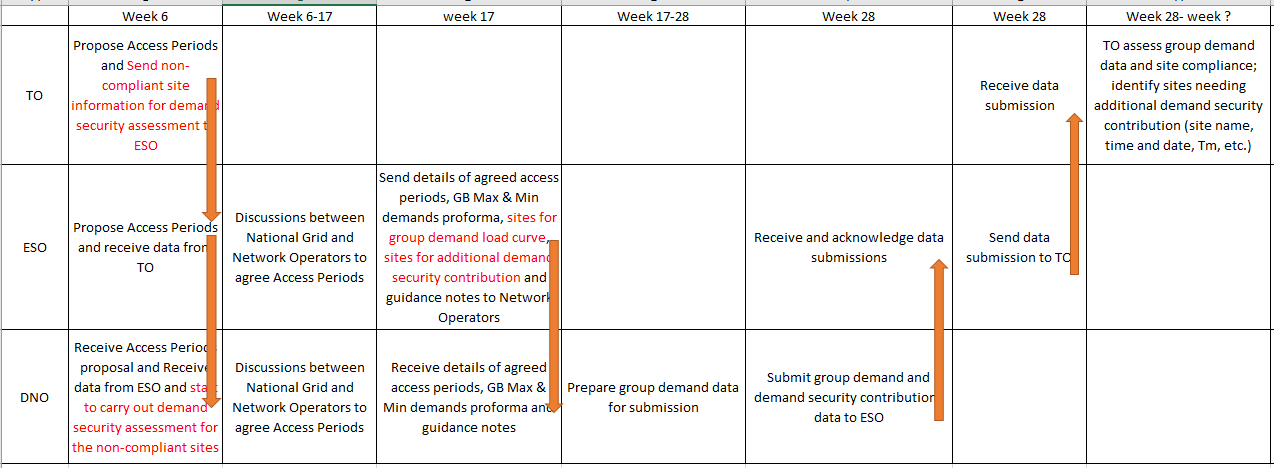
PC.A.4.8.2 No later than calendar week 17 each year **The Company** shall notify each **Network Operator** of the requirement to provide additional information about the resources available within the **Network Operator**`s **User System** that could be considered when assessing compliance with the demand connection capacity requirement criteria for the **Connection Point** as defined in the **NETS SQSS**. For each **Connection Point** notified, **The Company** shall specify the level of resources that it estimates to be required for compliance, the maximum level of resources that would be considered, and any other information that **Network Operator** reasonably requires in order to assess the security contribution from such resources.

**The proposed data exchange process is illustrated in the diagram below:**

****

A Workgroup member advised that GC0139 is looking to split the Weeks 24 and 28 process and add extra data exchange in week 2. The Proposer advised that they are aware of it and will clarify with the modification Proposers.

A workgroup member advised that the currently non-compliant sites would be discussed with relevant DNOs for the best solutions and these discussions would continue to happen in the next cycle of data submission. Therefore the proposed new data exchanges could be integrated to the next cycle of data submission as shown in the diagram below.



## Draft legal text

The draft legal text for this change can be found in Annex 3.

What is the impact of this change?

## Proposer’s assessment against Code Objectives

|  |  |
| --- | --- |
| **Proposer’s assessment against SQSS Objectives** | |
| **Relevant Objective** | **Identified impact** |
| (i) facilitate the planning, development and maintenance of an efficient, coordinated and economical system of electricity transmission, and the operation of that system in an efficient, economic and coordinated manner; | **Positive**  This modification will ensure that the requirements for demand connection applied by TOs and DNOs are consistent, which can facilitate that the investment on their networks is coordinated, economic, and efficient. |
| (ii) ensure an appropriate level of security and quality of supply and safe operation of the National Electricity Transmission System; | **Positive**  The modification will allow customers to receive the right level of demand security by updating the group demand definition and reviewing demand security contribution |
| (iii) facilitate effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in the distribution of electricity; and | **Neutral**  N/A |
| (iv) facilitate electricity Transmission Licensees to comply with any relevant obligations under EU law | **Neutral**  N/A |

**Standard Workgroup consultation question:** Do you believe that GSR029 Original proposal better facilitates the Applicable Objectives?

When will this change take place?

### Implementation date

*TBC*

### Date decision required by

*TBC*

### Implementation approach

*I.e. are there any system changes required?*

**Standard Workgroup consultation question:** Do you support the implementation approach?

Interactions

|  |  |  |  |
| --- | --- | --- | --- |
| Grid Code | ☐BSC | ☐STC | ☐SQSS |
| ☐European Network Codes | ☐ EBR Article 18 T&Cs[[1]](#footnote-2) | ☐Other modifications | ☐Other |

How to respond

## Standard Workgroup consultation questions

1. Do you believe that GSR029 Original proposal better facilitates the Applicable Objectives?
2. Do you support the proposed implementation approach?
3. Do you have any other comments?

## Specific Workgroup consultation questions

1. Xxxxxxxxx

The Workgroup is seeking the views of SQSS Users and other interested parties in relation to the issues noted in this document and specifically in response to the questions above.

Please send your response to [box.sqss@nationalgrideso.com](mailto:box.sqss@nationalgrideso.com) using the response pro-forma which can be found on the [GSR029 modification page.](https://www.nationalgrideso.com/industry-information/codes/security-and-quality-supply-standards-old/modifications/gsr029-review)

*If you wish to submit a confidential response, mark the relevant box on your consultation proforma. Confidential responses will be disclosed to the Authority in full but, unless agreed otherwise, will not be shared with the Panel, Workgroup or the industry and may therefore not influence the debate to the same extent as a non-confidential response.*

Acronyms, key terms and reference material

|  |  |
| --- | --- |
| **Acronym / key term** | **Meaning** |
| BSC | Balancing and Settlement Code |
| CMP | CUSC Modification Proposal |
| CUSC | Connection and Use of System Code |
| EBR | Electricity Balancing Guideline |
| STC | System Operator Transmission Owner Code |
| SQSS | Security and Quality of Supply Standards |
| T&Cs | Terms and Conditions |
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### Reference material

Annexes

|  |  |
| --- | --- |
| **Annex** | **Information** |
| Annex 1 | Proposal form |
| Annex 2 | Terms of reference |
| Annex 3 | Legal Text |
| Annex X |  |
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1. If the modification has an impact on Article 18 T&Cs, it will need to follow the process set out in Article 18 of the Electricity Balancing Regulation (EBR – EU Regulation 2017/2195) – the main aspect of this is that the modification will need to be consulted on for 1 month in the Code Administrator Consultation phase. N.B. This will also satisfy the requirements of the NCER process. [↑](#footnote-ref-2)