GC0092 – Using National Grid Network Models for Long Term Planning

What stage is this document at?

01	Workgroup Report
02	Industry Consultation
03	Report to the Authority

This proposal seeks to modify the Grid Code to allow the Distribution Network Operators (DNOs) to use National Electricity Transmission Study Network Data Files shared under the OC2 for planning as well as operational purposes.

The purpose of this document is to assist the Authority in its decision of whether to implement the proposed Grid Code Modification.

Published on: 30 June 2016

National Grid recommends:
GC0092 should be implemented as it better facilitates Applicable Grid Code objectives (i) (ii) (iii) and (iv)

High Impact:
Distribution Network Operators

Medium Impact:
Transmission Owner, System Operator, Generators

Low Impact:
None identified

Contents

Any Questions?

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Proposer:

UK Power Networks

About this document

This document is the report to the Authority for GC0092 which contains the responses to the Industry Consultation and the National Grid recommendation. The purpose of this document is to assist the Authority in their decision on whether to implement the GC0092 proposed changes.

The revisions to the Grid Code proposed by National Grid and sent to the Authority require approval by that body and will, if approved, come into force on such date (or dates) of which Authorised Electricity Operators will be notified by National Grid, in accordance with the Authority's approval.

Document Control

Version	Date	Author	Change Reference
1	30 June 2016	Franklin Rodrick National Grid	Report to the Authority

1 Executive Summary

Timeline of Events
25th Nov 2015 – Initial discussion of outline issue paper at GCRP.
4th Feb 2016 – Discussed at GCDF
16th Mar 2016 – Presented to GCRP
15th April 2016 – Industry Consultation published

1.1 This document describes the GC0092 Modification Proposal which seeks to modify the Grid Code to allow the Distribution Network Operators (DNOs) to use National Electricity Transmission Study Network Data Files shared under the OC2 for planning as well as operational purposes.

1.2 UK Power Networks has been awarded funding from Ofgem under the Low Carbon Network Fund 2014 competition to progress an innovation project (Kent Active System Management - KASM) which it is running in conjunction with National Grid and which aims to allow more precise operation and planning of the 132kV network in East Kent (South Eastern Power Networks' (SPN) area).

1.3 UK Power Networks currently receive two sets of data on the transmission system as required by section OC2 of the Grid Code.

- Week 42 data with simple static equivalents at Grid Supply Points to model transmission network which is used by UK Power Networks' Infrastructure planning team
- Two week ahead data in the form of National Electricity Transmission Study Network Data Files (NETSNDF) which is used by the UK Power Networks' Outage Planning team.

1.4 To accurately model power flows, UK Power Networks or any other DNO needs access to the unreduced transmission system network model, meaning the National Electricity Transmission Study Network Data File which they already receive at two weeks ahead. This Network Data file contains the expected output of Central Volume Allocated Generators which are connected to the Transmission System.

1.5 Grid Code OC.2.4.1.3.3.(i).(z).(5) currently allows Network Operators to use the National Electricity Transmission Study Network Data Files for operational purposes only. Legal clarification has been sought by National Grid which has confirmed this restriction.

1.6 GC0092 proposes to modify OC.2.4.1.3.3.(i).(z).(5) to allow Network Operators to use the NETSNDF for both planning and operational purposes. This will also allow realisation of the full benefits of the KASM project.

1.7 This issue was first raised at GCRP on behalf of UK Power Networks in November 2015 but further work was required to understand what exactly the issue was and to determine potential solutions.

1.8 Following further work done by UK Power Networks the issue was discussed at the February 2016 Grid Code Development Forum. The forum supported the proposal for a minor modification to the Grid Code removing the restriction on use of data, and for this to be raised at the Grid Code Review Panel.

1.9 An issue pro forma for GC0092 was submitted to the Grid Code Review Panel for consideration in March 2016. The Panel determined that the proposal should be progressed to Industry Consultation without further ado.

1.10 An industry consultation was published on 16 April 2016 for 20 business days. 5 responses were received and all of them were supportive.

1.11 Based on the initial proposal and the responses received from interested parties, National Grid recommends that the proposed changes in Annex 1 better facilitate the applicable Grid Code objectives.

2 Why Change?

2.1 With the increase in the penetration of distributed generation in the distribution network, the studies that need to be carried out in both operational and planning timescales to operate the system efficiently and plan appropriate future network investments are becoming ever more complex.

2.2 Due to the interconnected nature of the distribution network in the South East, generation patterns and system flows, UK Power Networks are experiencing increasingly complex power flows on the distribution network. These can cause issues such as potential post-fault plant overloads and reverse power flows towards National Grid's transmission system in excess of equipment rating.

2.3 Due to these complex power flows it is important to accurately model the whole network in longer-term planning timescales making it possible to ensure compliance with UK Power Networks' Bilateral Connection Agreements for their GSPs.

2.4 UK Power Networks' Outage Planning team uses the full NETSNDF to model the implications of certain post fault scenarios. These files are delivered two weeks ahead of real time and include expected output of Central Volume Allocated generators.

2.5 UK Power Networks' Infrastructure Planning team are however unable to fully use NETSNDF due to restrictions in the Grid Code allowing the use of these files for operational purposes only.

2.6 Full use of the NETSNDF would allow UK Power Networks or any other DNO to carry out better modelling of the interactions between the distribution and the transmission system and therefore to ensure better protection of distribution and transmission assets, better utilisation of existing infrastructure and more appropriate planning for future network investment.

2.7 The KASM Project which runs from Dec 2015 – Dec 2017 uses Contingency Analysis (CA) software for the purposes of real time network management, outage management and capacity management of the distribution network.

2.8 Unreduced forecasted transmission network model in the form of the NETSDF would allow UKPN as well as other DNOs to use the data for operational as well as planning purposes as and when required.

3 Solution

3.1 A number of potential solutions were discussed with industry representatives at the Grid Code Development Forum (GCDF) in February 2016 as follows:

Proposed Solution	Summary of View at GCDF
Conclude that NETS NDF data can be used for operational as well as planning purposes.	Based on legal advice obtained by both NG and UKPN it is thought that this is not the case and that the Grid Code restrict use to operational purposes only.
Seek a derogation from the Grid Code to allow sharing of data as required.	This is thought unlikely to be successful as it raises questions of data ownership which makes a derogation inappropriate. Generally derogations are only granted on a time-limited basis where a solution is also identified but also it is not clear what derogation would be sought against.
Seek permission from the data owners to use data as required.	In terms of the ownership of NETS NDF study data the owners are National Grid, DNOs and generators. Impractical to get permission from all parties.
Strip out any potentially confidential data from the study files.	National Grid have sought to progress this but have not achieved a reduced network that gives consistent results. In addition, unless automated this becomes a repetitive and labour intensive task which addresses the symptom and not the cause.
Make a change to the Grid Code to remove the restriction in OC2.4.1.3.3.(i).z.5 requiring the use of data supplied under this to be for operational purposes only.	Simplest solution and supported by GCDF

3.2 The industry participants at GCDF were in agreement that a straightforward change to the Grid Code to allow use of OC2 data as detailed for planning as well as operational purposes would be the best solution. No new data flows are required as part of this which will simply allow network operators to make full use of the data they already receive in line with OC2 and within the existing OC2 confidentiality requirements.

3.3 UK Power Networks have currently signed a confidentiality agreement with NGET covering the work on KASM and data being used in this. However, the proposed changes would all the DNOs to use the data without the need to sign a confidentiality agreement with NGET.

3.4 An issue paper describing this proposal was taken to GCRP on 16 March 2016 and is included as Annex 3 to this consultation. Following discussion, GCRP agreed that this should be taken straight to industry consultation.

3.5 The suggestions made through the industry consultation have also been taken into consideration. GC0092 seeks to implement the proposed legal text changes identified in Annex 1.

3.6 It is proposed to amend OC2.4.1.3.3.(i).z.5, of the Grid Code to address the above issue. It is also proposed to amend OC2.4.1.3.2(b), OC2.4.1.3.3(e) and OC2.4.1.3.4(b) of the Grid Code in response to the industry consultation for consistency purposes.

4 Impact & Assessment

Impact on the Grid Code

4.1 GC0092 requires amendments to the clause of the Grid Code:

- Operating Codes OC.2.4.1.3.3.(i).(z).(5), amend OC2.4.1.3.2(b), OC2.4.1.3.3(e) and OC2.4.1.3.4(b)

4.2 The text required to give effect to the proposal is contained in Annex 1 of this document.

Impact on National Electricity Transmission System (NETS)

4.3 The proposed changes will have a positive impact on the transmission system in terms of facilitating more co-ordinated planning.

Impact on Grid Code Users

4.4 The proposed changes will allow Network Operators to use the NETSNDF for planning purposes as well.

Impact on Greenhouse Gas emissions

4.5 The proposed changes will not have a material impact on Greenhouse Gas Emissions.

Assessment against Grid Code Objectives

4.6 National Grid considers that GC0092 will better facilitate the Grid Code objective:

(i) to permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity;

A solution will facilitate more efficient and co-ordinated operation and planning of the UK Power Networks' system with the potential for these benefits to be extended to the other DNOs. This in turn leads to more co-ordinated and efficient operation and planning of the transmission system

(ii) to facilitate competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the National Electricity Transmission System being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);

The proposed changes will allow DNOs to do better planning allowing them to facilitate connection of further embedded generation

(iii) subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the National Electricity Transmission System operator area taken as a whole; and

In light of the fact that under certain circumstances UK Power Networks or the other DNOs are now exporting to transmission system it is important to accurately model the whole network to ensure better protection of assets and allow better utilisation of existing infrastructure.

(iv) to efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency.

The proposed changes will allow UK Power Networks to improve their ability to comply with the GSP Bilateral Connection Agreements and future European Network Codes

Impact on core industry documents

4.7 The proposed modification only requires changes to the Grid Code.

Impact on other industry documents

4.8 The proposed modification does not impact on any other industry documents

Implementation

4.9 National Grid proposes GC0092 should be implemented 10 business days after an Authority decision.

5 Consultation Responses

5.1 An Industry Consultation was held which opened on 15 April 2016 and closed on 12 May 2016. 5 responses were received during the consultation period.

5.2 The table below provides an overview of the responses received. Copies of the responses are also included in Annex 2 of this report.

Ref	Company	Supportive	Comments
CR-01	RWE Group of GB companies, including RWE Generation UK plc, RWE Innogy UK Limited and RWE Supply & Trading GmbH	Yes	• RWE believe that the changes proposed by GC0092 better facilitate the appropriate Grid Code objectives • A couple of minor changes to the legal text were suggested by RWE to aid consistency. These are included in the final legal text in Annex 1
CR-02	Scottish Power Energy Networks	Yes	• Scottish Power Energy Networks support the changes suggested by GC0092
CR-03	Western Power Distribution	Yes	• Western Power Distribution support the changes suggested by GC0092. • Suggestion was made with regards to using IEC CIM to share the data due to differences in Planning tools that DNOs use. • The respondent has been informed that this is a wider work that may need looking at by the industry in the future.
CR-04	SSE Generation	Yes	• SSE Generation support the changes suggested by GC0092
CR-05	P2 Analysis	Yes	• P2 Analysis support the changes suggested by GC0092

National Grid Comments on Responses

5.3 National Grid would like to thank all respondents for their comments regarding GC0092.

5.4 The responses received were broadly supportive to change the Grid Code text to highlight the use of the NETSNDF file for planning purposes as well.

5.5 Of the supportive response, minor changes were made to the legal text as suggested by RWE mainly to other clauses - OC2.4.1.3.2(b), OC2.4.1.3.3(e) and OC2.4.1.3.4(b) to keep the requirements consistent with proposed changes to OC.2.4.1.3.3(i)(z)(5). Both parties were satisfied with these changes.

5.7 WPD supported the changes to the Grid Code as it would allow DNOs to do long term planning. However, they suggested that NGET should provide the data in a standard format (IEC Common Information Model) as all DNOs would have different planning tools. It was agreed between National Grid and the respondent that further work was required in the future to allow this change.

5.8 Scottish Power Energy Networks, SSE Generation and P2 Analysis were all supportive of the changes to the Grid Code and provided no further comments.

5.10 The suggested amendments to the legal text improve the clarity and have been incorporated into the final version.

Annex 1 - Proposed Legal Text

OC2.4.1.3 Planning of National Electricity Transmission System Outages

OC.2.4.1.3.3.(i).(z).(5)

the data from the **National Electricity Transmission System Study Network Data Files** received by each **Network Operator** must only be used by that **User** in planning and operating that **Network Operator's User System** and must not be used for any other purpose or passed on to, or used by, any other business of that **User** or to, or by, any person within any other such business or elsewhere.

OC2.4.1.3.2.(b)

By the end of week 13

Each **Generator** will inform **NGET** in writing of proposed outages in Years 2 - 5 ahead of **Generator** owned **Apparatus** (eg. busbar selectors) other than **Synchronous Generating Units**, and/or **Power Park Modules**, at each **Grid Entry Point**.

NGET will provide to each **Network Operator** and to each **Generator** and each **Interconnector Owner** a copy of the information given to **NGET** under paragraph (a) above (other than the information given by that **Network Operator**). In relation to a **Network Operator**, the data must only be used by that **User** in planning and operating that **Network Operator's User System** and must not be used for any other purpose or passed on to, or used by, any other business of that **User** or to, or by, any person within any other such business or elsewhere.

OC2.4.1.3.3.(e)

By the end of week 34

NGET will notify each **Generator**, **Interconnector Owner**, and **Network Operator**, in writing, of those aspects of the **National Electricity Transmission System** outage programme which may, in **NGET's** reasonable opinion, operationally affect that **Generator** (other than those aspects which may operationally affect **Embedded Small Power Stations** or **Embedded Medium Power Stations**), **Interconnector Owner**, or **Network Operator** including in particular proposed start dates and end dates of relevant **National Electricity Transmission System** outages.

NGET will provide to each **Network Operator** and to each **Generator** and each **Interconnector Owner** a copy of the information given to **NGET** under paragraph (c) above (other than the information given by that **Network Operator**). In relation to a **Network Operator**, the data must only be used by that **User** in planning and operating that **Network Operator's User System** and must not be used for any other purpose or passed on to, or used by, any other business of that **User** or to, or by, any person within any other such business or elsewhere.

OC2.4.1.3.4.(b)

Each **Generator** or **Interconnector Owner** or **Network Operator** or **Non-Embedded Customer** may at any time during Year 0 request **NGET** in writing for changes to the outages requested by them under OC2.4.1.3.3. In relation to that part of Year 0, excluding the period 1-7 weeks from the date of request, **NGET** shall determine whether the changes are possible and shall notify the **Generator**, **Interconnector Owner**, **Network Operator** or **Non-Embedded Customer** in question whether this is the case as soon as possible, and in any event within 14 days of the date of receipt by **NGET** of the written request in question.

Where **NGET** determines that any change so requested is possible and notifies the relevant **User** accordingly, **NGET** will provide to each **Network Operator**, each **Interconnector Owner**, and each **Generator** a copy of the request to which **NGET** has agreed which relates to outages on **Systems** of **Network Operators** (other than any request made by that **Network Operator**). The information must only be used by that **Network Operator** in planning and operating that **Network Operator's User System** and must not be used for any other purpose or passed on to, or used by, any other business of that **User** or to, or by, any person within any other such business or elsewhere.

Annex 2 – Consultation Responses

CR-01 RWE

GC0092 Using National Grid Network Models for Long Term Planning

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **12 May 2016** to Grid.Code@nationalgrid.com. Please note that any responses received after the deadline or sent to a different email address may not receive due consideration.

These responses will be included in the Report to the Authority which is drafted by National Grid and submitted to the Authority for a decision.

Respondent:	John Norbury Network Connections Manager RWE Supply & Trading GmbH Windmill Hill Business Park Whitehill Way Swindon SN5 6PB T +44 (0)1793 89 2667 M +44 (0)7795 354 382 john.norbury@rwe.com
Company Name:	RWE Group of GB companies, including RWE Generation UK plc, RWE Innogy UK Limited and RWE Supply & Trading GmbH
1. Do you support the proposed implementation approach of 10 business days following an Authority decision?	We support the proposed implementation approach given in the Consultation paragraph 4.8
2. Do you believe that GC0023 better facilitates the appropriate Grid Code objectives?	Yes subject to clarification of the final point raised below under item 4.
3. Do you support the proposed changes to CC.6.2.2.2 and CC.6.2.3.1	Our support for the change to OC.2.4.1.3.3(i)(z)(5) is subject to clarification of the final point raised below under item 4.
4. Do you have any additional comments?	We are not entirely convinced of the need for this change, which seeks to clarify that "operating a network" also includes the planning of its operation. Given that the Data Files are released to Network Operators under OC2 from 1-year ahead, it is difficult to envisage the intent of releasing data at that time for any use other than for planning. Notwithstanding this, we note that OC2.4.1.3.2(b),

	OC2.4.1.3.3(e) and OC2.4.1.3.4(b) similarly specify that data released by NGET to Network Operators must be used for operational purposes only. We would therefore expect that changes, similar to those proposed to OC.2.4.1.3.3(i)(z)(5), would be required to be made to these clauses. If such changes are not required, please clarify why this is the case.

CR-02 Scottish Power Energy Networks

GC0092 Using National Grid Network Models for Long Term Planning

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **12 May 2016** to Grid.Code@nationalgrid.com. Please note that any responses received after the deadline or sent to a different email address may not receive due consideration.

These responses will be included in the Report to the Authority which is drafted by National Grid and submitted to the Authority for a decision.

Respondent:	*Martin McDonald.* *Martin.mcdonald@everis.com*
Company Name:	*Everis Ltd on behalf of ScottishPower Energy Networks.*
5. Do you support the proposed implementation approach of 10 business days following an Authority decision?	*Yes.*
6. Do you believe that GC0092 better facilitates the appropriate Grid Code objectives?	*Yes. Agree that the suggested change will better facilitate the Grid Code objectives as listed in the "Assessment against Grid Code Objectives" section of the Industry Consultation document.*
7. Do you support the proposed changes to OC.2.4.1.3.3.(i).(z).(5)	*Yes as this change will add clarification into OC2 in that the information provided can be used to aid in the longer term planning of the Distribution network.*
8. Do you have any additional comments?	*No.*

CR-03 Western Power Distribution

GC0092 Using National Grid Network Models for Long Term Planning

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **12 May 2016** to Grid.Code@nationalgrid.com. Please note that any responses received after the deadline or sent to a different email address may not receive due consideration.

These responses will be included in the Report to the Authority which is drafted by National Grid and submitted to the Authority for a decision.

Respondent:	*Yiango Mavrocostanti* *ymavrocostanti@westernpower.co.uk*
Company Name:	*Western Power Distribution*
9. Do you support the proposed implementation approach of 10 business days following an Authority decision?	*The implementation approach is supported. It is, however, expected that a period of time will be required for DNOs to establish processes for the utilisation of the data.*
10. Do you believe that GC0092 better facilitates the appropriate Grid Code objectives?	*i) GC0092 could enable more accurate modelling of the power flows in distribution networks that are heavily interconnected. This could improve the way these networks are operated and maintained resulting in a more efficient distribution network management and reflecting these benefits to the transmission system.* *Having access to the full electrical models of the transmission system, could also enable better long term planning of interconnected distribution networks. To be able to use these models for network planning, however, guidance on how to modify the models to represent certain extreme and normal operating scenarios should also be provided to DNOs.* *It is important to note that not all areas of the distribution network are of the interconnected nature, therefore the benefits will not always be applicable.* *ii) GC0092 could allow DNOs to improve their ANM schemes and better assess the*

	required curtailment of generators. *iii) Through the improvements in the modelling of heavily interconnected distribution networks that GC0092 would facilitate, the interaction between these networks and the transmission system would be better assessed. This could result in improved protection of both systems.* *iv) It is not expected that GC0092 will have any negative effect in the DNO's ability to comply with the Electricity Regulation.*
v) Do you support the proposed changes to OC.2.4.1.3.3.(i).(z).(5)	*The proposed changes to OC.2.4.1.3.3.(i).(z).(5) are supported.*
vi) Do you have any additional comments?	*1. As different DNOs use different planning tools, providing the data in a format that will be suitable for all DNOs will be a challenge.* *2. The IEC Common Information Model format is suggested as the best data structure for sharing data.* *3. At the moment, the data will be useful mainly for distribution networks that are heavily interconnected.* *4. Should a DNO become a DSO, the benefits of having these data will be much greater.* *5. It is expected that a significant amount of time will be required for DNOs to start making full use of the data and the usage will depend on the nature of the network of each DNO.*

CR-04 SSE Generation

GC0092 Using National Grid Network Models for Long Term Planning

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **12 May 2016** to Grid.Code@nationalgrid.com. Please note that any responses received after the deadline or sent to a different email address may not receive due consideration.

These responses will be included in the Report to the Authority which is drafted by National Grid and submitted to the Authority for a decision.

Respondent:	*Damian Jackman, 0141 2247107 damian.jackman@sse.com*
Company Name:	*SSE Generation*
11. Do you support the proposed implementation approach of 10 business days following an Authority decision?	*Yes*
12. Do you believe that GC0092 better facilitates the appropriate Grid Code objectives?	Yes
13. Do you support the proposed changes to OC.2.4.1.3.3.(i).(z).(5)	Yes
14. Do you have any additional comments?	No

CR-5 P2 Analysis

GC0092 Using National Grid Network Models for Long Term Planning

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **12 May 2016** to Grid.Code@nationalgrid.com. Please note that any responses received after the deadline or sent to a different email address may not receive due consideration.

These responses will be included in the Report to the Authority which is drafted by National Grid and submitted to the Authority for a decision.

Respondent:	*Mike Kay* *07768 038913* *mkay@iee.org*
Company Name:	*P2 Analysis*
15. Do you support the proposed implementation approach of 10 business days following an Authority decision?	*Yes*
16. Do you believe that GC0092 better facilitates the appropriate Grid Code objectives?	Yes
17. Do you support the proposed changes to OC.2.4.1.3.3.(i).(z).(5)	Yes
18. Do you have any additional comments?	No

Grid Code Review Panel

Using National Grid Network Models for Long Term Planning

Date Raised: 2 March 2016

GCRP Ref: pp16/24

A Panel Paper by

UK Power Networks

Summary

East Kent is a particularly complex area of the GB system where the distribution network is heavily influenced by HVDC interconnector flows and other types of transmission connected generation. In parallel with this, due to the increasing amount of embedded generation connected to the system, GSPs are increasingly experiencing reverse power flows from the distribution network onto the transmission system. UK Power Networks has been awarded £3.4m funding from Ofgem under the Low Carbon Network Fund 2014 competition to progress an innovation project (Kent Active System Management - KASM) which it is running in conjunction with National Grid and which aims to allow more precise operation and planning of the 132kV network in East Kent (South Eastern Power Networks' (SPN) area). This is expected to demonstrate the following benefits:

- Operation of the network closer to its limits in a secure and reliable manner, enabling the connection of additional low carbon generation while improving the efficiency of future network reinforcement projects;
- Reduction in the impact of planned network outages on power export from existing generators;
- Improvements in operational processes and reduction in the overall risk on the transmission and distribution network.

In December 2015, the project established an ICCP link between National Grid and UK Power Networks control rooms, which will enable the two parties to share real time data including power flows and switch statuses.

To accurately model power flows, UK Power Networks needs access to an unreduced transmission system network model. UK Power Networks currently receives two sets of data on the transmission system as required by section OC2 of the Grid Code:

- As part of the annual week 42 process, a reduced network with simple static equivalents at Grid Supply Points to model the transmission network. This is used by UK Power Networks' Infrastructure Planning team.
- On a weekly basis at two weeks ahead of real time, an unreduced forecasted transmission network model in the form of National Electricity Transmission Study Network Data Files are extracted from the PowerFactory modelling tool. This includes the expected output of Central Volume Allocated generators. This data, which is used by the Operational Planning team, is also being used by the KASM project but is supplied in accordance with Grid Code OC2.4.1.3.3.(i).z.5 which states that:

'…the data from the National Electricity Transmission System Study Network Data Files received by each Network Operator ***must only be used***

by that User in operating that Network Operator's User System *and must not be used for any other purpose or passed on to, or used by, any other business of that User or to, or by, any person within any other such business or elsewhere.'*

A solution to allow UK Power Networks use of data in the National Electricity Transmission Study Network Data Files for operational **and** planning purposes would help to realise the full benefits of the KASM project. This data could then also be utilised for: long term operability studies to accurately assess the network for future generation, new technology connections, maximising utilisation of existing assets; and finally, allowing the same network model to be used for all purposes which would achieve considerable efficiencies.

This paper has been written following presentation and discussion at the Grid Code Development Forum on 3 February 2016 which helped to consider the alternatives and develop these for presentation to GCRP.

Users Impacted

High

Distribution Network Operators – as it allows better and more coordinated system planning

Medium

Transmission Owners, System Operators, Generators – better planning by DNOs will allow more efficient use of and investment in the system

Low

None

Description & Background

As distributed generation penetration increases in the distribution network, so also do the complexity of studies that need to be carried out in both operational and planning timescales to operate the system as efficiently as possible and to plan appropriate future network investments.

Due to the interconnected nature of the distribution network in the South East, generation patterns and system flows, UK Power Networks are experiencing increasingly complex power flows on the distribution network. These can cause issues such as potential post-fault plant overloads and reverse power flows towards National Grid's transmission system in excess of equipment ratings. In light of the fact that under certain conditions UK Power Networks are now exporting to National Grid's network, and because the particular network configuration in the area means that the distribution system is heavily influenced by power flows in the transmission network, it is important to accurately model the whole network in longer-term planning timescales making it possible to ensure compliance with UK Power Networks' Bilateral Connection Agreements for their GSPs. Moving forward this will also be

important when ensuring compliance with future applicable European Network Codes.

Furthermore, the ability to model the full network including 400kV and 275kV running arrangements will ensure better protection of distribution and transmission assets, better utilisation of existing infrastructure, and more appropriate planning of future network investments. Furthermore, it will also mean that the results we produce align with those being produced by NG System Development team meaning a more co-ordinated approach and understanding of the issues.

The **Operational Planning team (Outage management)** at UK Power Networks is seeing first-hand the implications of certain post-fault scenarios during outage conditions in connection assets such as SGTs, as modelled using the full National Electricity Transmission Study Network Data Files supplied by National Grid under OC2. These files are delivered on a weekly basis in Power Factory (pfd) format and provide a static forecast of the transmission network two weeks ahead of real time. Included in these files is the expected output of Central Volume Allocated generators, which are connected to the transmission network. When UK Power Networks receives the files they are merged with the existing DNO network model in Power Factory by UK Power Networks' DigSilent Administrators. This model includes the characteristics of embedded generation so giving a complete and accurate model.

UK Power Networks' **Infrastructure Planning team (Network Capacity Management)** are not able to access the two week ahead data supplied under OC2 due to a restriction in the Grid Code allowing its use for operational purposes only. This is a longstanding issue, but is highlighted by the KASM project and increasing system complexity. Interactions between the distribution and transmission systems are not being completely portrayed by the model used in infrastructure planning since this employs a reduced network for the transmission system, modelled as static equivalents at each GSP, and as defined in the Planning Code forming part of the Grid Code, Appendix A part 3.

The **KASM project** which is running from Dec 2015 – Dec 2017 uses Contingency Analysis (CA) software for the purposes of real time network management, outage management and capacity management of the distribution network. It needs to use accurate network models for the distribution and transmission networks, and allows users to model multiple N-1 scenarios to determine any potential future constraints on the network. UK Power Networks believes that for KASM to deliver the full benefits associated with operating the network closer to its limits, it is vital that planners in all timescales are able to make use of accurate network models.

If UK Power Networks were able to use the unreduced forecasted transmission network model in the form of the National Electricity Transmission Study Network Data Files for planning as well as operational purposes this would allow the unrestricted use of the improved modelling and contingency analysis in KASM. Furthermore, allowing the use of a common model for operational and planning purposes would also be more efficient in terms of software architecture.

Proposed Solution

A number of options have been proposed to resolve this issue:

(i) Conclude that National Electricity Transmission Study Network Data Files can be used for planning purposes as well as operationally. Based on legal advice it is thought that this is not the case and that the Grid Code does restrict such use.
(ii) Seek a derogation from the Grid Code to allow sharing of data as required. This is unlikely to be successful as it raises questions of data ownership which makes a derogation inappropriate. Generally derogations are only granted on a time-limited basis where a solution is also identified but also it is not clear what derogation would be sought against.
(iii) Seek permission from the data owners to use data as required. In terms of the ownership of National Electricity Transmission Study Network Data Files the owners are National Grid, DNOs and generators.
(iv) Strip out any potentially confidential data from the study files. This could be an interim solution but unless automated becomes a repetitive and labour intensive task which addresses the symptom and not the cause.
(v) Make a change to the Grid Code to remove the restriction in OC2.4.1.3.3.(i).z.5 requiring the use of data supplied under this to be for operational purposes only.

UK Power Networks clarified as part of their presentation to GCDF that KASM will be undergoing operational testing starting in April. If the issue explored in this paper is not resolved by then it will either delay or limit these tests. On presentation at GCDF, the conclusions reached on each of the proposed actions were as follows:

(i) NGET and UK Power Networks have both checked with their legal teams and reiterate that the restriction in the Grid Code is binding (if unclear in intent)

(ii) A derogation could perhaps succeed if it could be clarified exactly what this would be against. In terms of the time to progress this it would though be unlikely to be resolved before April and would gain little or no time over a more enduring code change.

(iii) Genuinely confidential data is likely to be the generator performance or modelling parameters supplied in confidence to NGET by manufacturers. As the study file includes data for the whole system, gaining appropriate permissions even if possible would be time-consuming and difficult to prove complete.

(iv) NGET are progressing the option to strip out confidential data. A file has been supplied to UK Power Networks but study results using this are not the same as for the full network. Work on this option will continue but it is a complex and time-consuming task.

(v) GCDF were in agreement that a straightforward change to the Grid Code to allow use of OC2 data as detailed for planning as well as operational purposes would be the best solution. No new data is being supplied to UK Power Networks; this change would just allow them to make full use of data that they already hold and which is subject to existing OC2 confidentiality requirements. UK Power Networks have additionally signed a confidentiality agreement with NGET covering the work on KASM and data being used in this.

Proposed Change to Legal Text

It is recommended that the text of the Grid Code Operating Condition OC2.4.1.3.3.(i).z is changed to that given below. The text in red highlights the proposed new insertions and changes.

OC2.4.1.3.3.(i).z

(5) the data from the National Electricity Transmission System Study Network Data Files received by each Network Operator must only be used by that User in operating or

planning that Network Operator's User System and must not be used for any other purpose or passed on to, or used by, any other business of that User or to, or by, any person within any other such business or elsewhere.

Assessment against Grid Code Objectives

[Will the proposed changes to the Grid Code better facilitate any of the Grid Code Objectives:]

(i) to permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity;

A solution will facilitate more efficient and coordinated operation and planning of the UK Power Networks system with the potential for these benefits to be extended to other DNOs; this in turn leads to more coordinated and efficient operation and planning of the transmission system.

(ii) to facilitate competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);

Better DNO planning will help to facilitate connection of further embedded generation.

(iii) subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole; and

In light of the fact that under certain conditions UK Power Networks are now exporting to National Grid's network it is important to accurately model the whole network to ensure better protection of assets and allow better utilisation of existing infrastructure.

(iv) to efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency.

A solution will improve UK Power Networks' ability to comply with their GSP Bilateral Connection Agreements and future European Network Codes.

Impact & Assessment

Impact on the National Electricity Transmission System (NETS)

Positive in terms of facilitating more coordinated planning.

Impact on Greenhouse Gas Emissions

Will help to facilitate connection of further embedded generation which will be predominantly renewables.

Impact on core industry documents

[Will any of the proposed changes have any impact on other core industry documents such as the BSC, CUSC, Grid Code or STC?]

Just Grid Code – OC2.

Impact on other industry documents

Unlikely.

Supporting Documentation

Have you attached any supporting documentation [YES]

If Yes, please provide the title of the attachment:

- KASM Low Carbon Networks Project Submission

Recommendation

The Grid Code Review Panel is invited to:

[Progress this issue to Industry Consultation]

While this issue is raised by UK Power Networks, it is likely to be an increasing issue for all DNOs as system complexity increases.

As the proposed change to the Grid Code is very minor in nature and is essentially housekeeping, it is proposed that it should be taken straight to industry consultation to save time and allow completion as soon after the April 2016 start of KASM operational testing as possible.

NGET notes that if open governance had been implemented at the time that this proposal was taken forwards, this change could have been progressed under the auspices of self-governance which would have been quicker and more efficient.

Document Guidance

This proforma is used to raise an issue at the Grid Code Review Panel, as well as providing an initial assessment. An issue can be anything that a party would like to raise and does not have to result in a modification to the Grid Code or creation of a Working Group.

Guidance has been provided in square brackets within the document but please contact National Grid, The Code Administrator, with any questions or queries about the pro forma at grid.code@nationalgrid.com .